

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) ¹⁾ Energy Saver Ssystem (ESS) External Battery Cabinets (EBC) Internal ¹⁾ & External transformers Earth fault monitoring ¹⁾ 24 V Emergency power off interface ¹⁾ DNV-GL type approval with additional EMC filter ¹⁾	
	Upgradability	Yes, up to 20 kW	Yes, up to 40 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)	356 x 875 x 1370 mm ²⁾	503 x 975 x 1810 mm	
	Weight	UPS	112 kg	207 kg
		UPS + input transformer	252 kg	407 kg
		UPS + output transformer	202 kg	382 kg
		UPS + input + output transformer	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 ²⁾		
	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)		
	Vibration resistance	DNV GL CG-0339 Vibration class A		
		DNV GL CG-0339 Enclosure class A		

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ENVIRONMENTAL

6.5.5	Acoustic noise at 1 m, in 25 °C ambient temperature ³⁾	< 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
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 DNV GL CG-0339 Humidity class A
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 ³⁾		<u>8 kW</u>	<u>10 kW</u>	<u>15 kW</u>	<u>20 kW</u>	<u>30 kW</u>	<u>40 kW</u>
		100% load	95.9%	96.1%	96.0%	95.8%	96.1%	95.7%
		75% load	95.5%	95.8%	96.1%	96.1%	96.1%	96.1%
		50% load	94.5%	95.1%	95.8%	96.1%	95.9%	96.2%
		25% load	91.5%	92.5%	94.3%	95.2%	94.6%	95.5%
	Heat dissipation in double conversion ³⁾		<u>8 kW</u>	<u>10 kW</u>	<u>15 kW</u>	<u>20 kW</u>	<u>30 kW</u>	<u>40 kW</u>
100% load		328 W	390 W	600 W	840 W	1170 W	1720 W	
75% load		270 W	315 W	489 W	585 W	878 W	1170 W	
50% load		220 W	245 W	315 W	390 W	615 W	760 W	
25% load		170 W	188 W	214 W	240 W	405 W	450 W	
	Efficiency in ESS-mode, rated linear load ³⁾		<u>8 kW</u>	<u>10 kW</u>	<u>15 kW</u>	<u>20 kW</u>	<u>30 kW</u>	<u>40 kW</u>
100% load		98.2%	98.5%	98.6%	98.7%	98.8%	98.8%	
75% load		97.9%	98.2%	98.5%	98.6%	98.7%	98.8%	
50% load		97.1%	97.5%	98.2%	98.4%	98.5%	98.6%	
25% load		94.8%	95.5%	96.9%	97.4%	97.6%	98.0%	
	Efficiency for internal input transformer ⁴⁾		<u>25 kVA transformer</u>				<u>50 kVA transformer</u>	
100% load		96.8%				97.1%		
75% load		97.2%				97.6%		
50% load		97.2%				97.8%		
25% load		96%				97.1%		
	Efficiency for internal output isolation transformer ⁴⁾		<u>20 kVA transformer</u>				<u>40 kVA transformer</u>	
		<u>Isolation</u>		<u>Auto</u>		<u>Isolation</u>	<u>Auto</u>	
100% load		96.5%		96.1%		96.8%	96.1%	
75% load		96.8%		96.2%		97.3%	96.4%	
50% load		96.6%		95.7%		97.5%	96.2%	
25% load		94.9%		93.2%		96.6%	94.3%	

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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 ⁵⁾					
	Voltage tolerance Rectifier input Bypass input Input transformer	338 to 480 V -15% / +10% of rated input voltage +/- 10 % ⁵⁾					
5.2.1 c and 5.2.1 d	Rated input frequency Frequency tolerance	50 or 60 Hz, user configurable 40 to 72 Hz					
5.2.2 a and 5.2.2 b	Number of input phases Rectifier input Bypass input	3 phases + neutral, 3 phases ⁵⁾ 3 phases + neutral, 3 phases ⁵⁾					
5.2.2 d	Input power factor, double conversion, rated load	<u>8 kW</u> 1.00 0.95 ⁵⁾	<u>10 kW</u> 1.00 0.95 ⁵⁾	<u>15 kW</u> 1.00 0.95 ⁵⁾	<u>20 kW</u> 1.00 0.95 ⁵⁾	<u>30 kW</u> 1.00 0.97 ⁵⁾	<u>40 kW</u> 1.00 0.97 ⁵⁾
5.2.2 c	Rated input r.m.s. current	<u>8 kW</u> 380 V 13 A 400 V 12 A 415 V 12 A 208 V ⁵⁾ 24 A 230 V ⁵⁾ 22 A 380 V ⁵⁾ 13 A 400 V ⁵⁾ 12 A 415 V ⁵⁾ 12 A 440 V ⁵⁾ 11 A 480 V ⁵⁾ 10 A 690 V ⁵⁾ 7 A	<u>10 kW</u> 16 A 15 A 15 A 30 A 27 A 16 A 16 A 15 A 14 A 13 A 9 A	<u>15 kW</u> 24 A 23 A 22 A 45 A 41 A 25 A 23 A 22 A 21 A 19 A 14 A	<u>20 kW</u> 32 A 30 A 29 A 60 A 54 A 33 A 31 A 30 A 28 A 26 A 18 A	<u>30 kW</u> 48 A 46 A 44 A 89 A 81 A 49 A 46 A 45 A 42 A 39 A 27 A	<u>40 kW</u> 63 A 61 A 58 A 119 A 108 A 65 A 62 A 60 A 56 A 52 A 36 A
5.2.2 f	Maximum input r.m.s. current	<u>8 kW</u> 15 A 30 A ⁵⁾	<u>10 kW</u> 19 A 36 A ⁵⁾	<u>15 kW</u> 29 A 51 A ⁵⁾	<u>20 kW</u> 38 A 65 A ⁵⁾	<u>30 kW</u> 57 A 95 A ⁵⁾	<u>40 kW</u> 76 A 125 A ⁵⁾
5.2.2 h and 5.2.2. i	Input current distortion at rated input current Resistive load Non-linear load	< 3% < 5%					
5.2.2 e	In-rush current	< Rated input current (input filter components only) 8 * transformer nominal current ⁵⁾					
5.2.2 k	AC power distribution system compatibility	TN, TT, IT 3W ⁵⁾ , IT 4W					
	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					

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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 ⁶⁾					
5.3.2 b	Output voltage variation, steady state	< 1 % < 3.5% ⁶⁾					
5.3.2 i	Total voltage harmonic distortion 100% linear load 100% non-linear load	< 1.5% < 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 Recovery time to steady state at 100% step load	4 % 100 ms					
5.3.2 c	Rated output frequency Output frequency variation Slew rate	50 or 60 Hz, configurable ± 0.1 Hz (1 x UPM), ± 0.15 Hz (2 x UPM) 0.8 - 1 Hz/s					
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 (configurable 0.5 to 5 Hz) < 2° with static balanced load 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	<u>Power rating 8 – 15 and 30 kW</u> 10 min ≤135% load 60 sec ≤155% load 10 sec ≤185% load 300 ms >186% load			<u>Power rating 20 and 40 kW</u> 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 10 min 125% load ⁶⁾		
5.3.2 m	Output current limitation, short-circuit capability ³⁾	<u>1 x UPM</u> 72 A, 300 ms			2 x UPM 144 A, 300 ms		
6.4.2.10.3 and 6.4.2.10.4	Fault clearing capability ³⁾	<u>1 x UPM</u> Circuit breaker B10 / C6			<u>2 x UPM</u> 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					

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ESS MODE CHARACTERISTICS

	Transfer time to double-conversion Mains available Mains failure	No break Typically 2 ms
	Output voltage variation setting	$\pm 10\%$ 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.

BYPASS

	Type of bypass	Static					
	Bypass rating	20 kW				40 kW	
	Bypass voltage range	380 V; 400 V; 415 V tolerance -15% / +10% of rated voltage 208 V – 690 V ⁵⁾ +/- 10 % ⁵⁾					
	Transfer time break	No break					
	Maintenance bypass	Optional					
	Bypass fuse i²t value, Pre-arc i²t Total clearing i²t	1000 A²s 3700 A²s				1900 A²s 7100 A²s	
	Required external bypass protective fuse, recommended rating	<u>8 kW</u>	<u>10 kW</u>	<u>15 kW</u>	<u>20 kW</u>	<u>30 kW</u>	<u>40 kW</u>
	208 V input	32 A	40 A	63 A	80 A	125 A	160 A
	230 V input	32 A	40 A	50 A	80 A	100 A	125 A
	380 V input	20 A	25 A	32 A	40 A	63 A	80 A
	400 V input	20 A	25 A	32 A	40 A	63 A	80 A
	415 V input	16 A	20 A	32 A	40 A	63 A	80 A
	440 V input	16 A	20 A	32 A	40 A	50 A	63 A
	480 V input	16 A	20 A	25 A	32 A	50 A	63 A
	690 V input	10 A	16 A	20 A	25 A	32 A	50 A
	Rated conditional short-circuit current, I _{cc} Static bypass Optional integrated maintenance bypass	50 kA (internal ultra rapid fusing) 10 kA / 50 kA ^{5), 6)}					

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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	336 V – 480 V	
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 5 A, configurable 1...25 A 1...15 A	2 x UPM 10 A, configurable 2...50 A 2...30 A
	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 Degree of protection	Operator access IP 23 protection against medium sized foreign matter (incl. finger) protection against sprayed water up to 60 degree angle	
	Cabling material ⁷⁾	IEC 60754-1 (Halogen free) IEC 60754-2 (Degree of acidity of gasses) IEC 61034-2 (Smoke density) IEC 60332-3 or 1 (Flame resistance)	
	Internal transformers	IEC 60076, IEC 60950-1, IEC 62477-1	
IEC 62040-2	Electromagnetic Compatibility Immunity Emissions	EMC Category C3 EMC Category C2	
		DNV GL CG-0339 EMC class B ⁸⁾	DNV GL CG-0339 EMC class A ⁸⁾
IEC 62040-4 EN 50581	Environmental Aspects - Requirements and Reporting	Yes	

¹⁾ Option to be pre-installed at factory

²⁾ Height 1500 mm with wall mount bracket

³⁾ Optional transformer impact neglected.

⁴⁾ Values are stated at nominal condition, are subject to normal production tolerances and may vary.

⁵⁾ With input transformer

⁶⁾ With output transformer

⁷⁾ Some exceptions in auxiliary power or signal cabling may occur

⁸⁾ With optional EMC filter.

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