

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 |
| | | UPS + input transformer | 252 kg |
| | | UPS + output transformer | 202 kg |
| | | UPS + input + output transformer | 342 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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Document: Eaton 93PS Marine 8-40kW technical specification Rev 03

The technical specification is subject to change without notice

Page 1 of 6

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⁾ | 100% load | <u>8 kW</u> | <u>10 kW</u> | <u>15 kW</u> | <u>20 kW</u> | <u>30 kW</u> | <u>40 kW</u> |
| | | 75% load | 95.9% | 96.1% | 96.0% | 95.8% | 96.1% | 95.7% |
| | | 50% load | 95.5% | 95.8% | 96.1% | 96.1% | 96.1% | 96.1% |
| | | 25% load | 94.5% | 95.1% | 95.8% | 96.1% | 95.9% | 96.2% |
| | Heat dissipation in double conversion ³⁾ | 100% load | <u>8 kW</u> | <u>10 kW</u> | <u>15 kW</u> | <u>20 kW</u> | <u>30 kW</u> | <u>40 kW</u> |
| | | 75% load | 328 W | 390 W | 600 W | 840 W | 1170 W | 1720 W |
| | | 50% load | 270 W | 315 W | 489 W | 585 W | 878 W | 1170 W |
| | | 25% load | 220 W | 245 W | 315 W | 390 W | 615 W | 760 W |
| | Efficiency in ESS-mode, rated linear load ³⁾ | 100% load | <u>8 kW</u> | <u>10 kW</u> | <u>15 kW</u> | <u>20 kW</u> | <u>30 kW</u> | <u>40 kW</u> |
| | | 75% load | 98.2% | 98.5% | 98.6% | 98.7% | 98.8% | 98.8% |
| | | 50% load | 97.9% | 98.2% | 98.5% | 98.6% | 98.7% | 98.8% |
| | | 25% load | 97.1% | 97.5% | 98.2% | 98.4% | 98.5% | 98.6% |
| | Efficiency for internal input transformer ⁴⁾ | 100% load | <u>25 kVA transformer</u> | | | | <u>50 kVA transformer</u> | |
| | | 75% load | 96.8% | | | | 97.1% | |
| | | 50% load | 97.2% | | | | 97.6% | |
| | | 25% load | 97.2% | | | | 97.8% | |
| | Efficiency for internal output isolation transformer ⁴⁾ | 100% load | <u>20 kVA transformer</u> | | <u>40 kVA transformer</u> | | | |
| | | 75% load | <u>Isolation</u> | <u>Auto</u> | <u>Isolation</u> | <u>Auto</u> | | |
| | | 50% load | 96.5% | 96.1% | 96.8% | 96.1% | | |
| | | 25% load | 96.8% | 96.2% | 97.3% | 96.4% | | |
| | | 96.6% | 95.7% | 97.5% | 96.2% | | | |
| | | 94.9% | 93.2% | 96.6% | 94.3% | | | |

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> | <u>10 kW</u> | <u>15 kW</u> | <u>20 kW</u> | <u>30 kW</u> | <u>40 kW</u> |
| | 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 |
| | 208 V ⁵⁾ | 24 A | 30 A | 45 A | 60 A | 89 A | 119 A |
| | 230 V ⁵⁾ | 22 A | 27 A | 41 A | 54 A | 81 A | 108 A |
| | 380 V ⁵⁾ | 13 A | 16 A | 25 A | 33 A | 49 A | 65 A |
| | 400 V ⁵⁾ | 12 A | 16 A | 23 A | 31 A | 46 A | 62 A |
| | 415 V ⁵⁾ | 12 A | 15 A | 22 A | 30 A | 45 A | 60 A |
| | 440 V ⁵⁾ | 11 A | 14 A | 21 A | 28 A | 42 A | 56 A |
| | 480 V ⁵⁾ | 10 A | 13 A | 19 A | 26 A | 39 A | 52 A |
| | 690 V ⁵⁾ | 7 A | 9 A | 14 A | 18 A | 27 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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Document: Eaton 93PS Marine 8-40kW technical specification Rev 03

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Page 3 of 6

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> | | | <u>Power rating 20 and 40 kW</u> | | |
| | Static bypass overload capability | 10 min $\leq 135\%$ load 60 sec $\leq 155\%$ load 10 sec $\leq 185\%$ load 300 ms $> 186\%$ load | | | 10 min $\leq 110\%$ load 60 sec $\leq 125\%$ load 10 sec $\leq 150\%$ load 300 ms $> 150\%$ load | | |
| 5.3.2 m | Output current limitation, short-circuit capability ³⁾ | 20 ms 1000% load continuous 125% load | | | 20 ms 1000% load continuous 125% load 10 min 125% load ⁶⁾ | | |
| 6.4.2.10.3 and 6.4.2.10.4 | Fault clearing capability ³⁾ | 1 x UPM 72 A, 300 ms | | | 2 x UPM 144 A, 300 ms | | |
| 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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Document: Eaton 93PS Marine 8-40kW technical specification Rev 03

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Page 4 of 6

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 | 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 i ² t value, Pre-arc i ² t Total clearing i ² t | 1000 A ² s 3700 A ² s | | | 1900 A ² s 7100 A ² s | | |
| | 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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Document: Eaton 93PS Marine 8-40kW technical specification Rev 03

The technical specification is subject to change without notice
Page 5 of 6

| 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 | <u>1 x UPM</u> 5 A, configurable Load ≤80% 1...25 A Load >80% 1...15 A | <u>2 x UPM</u> 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.