# Eaton 93PM 60-250 kVA UPS Technical Specification

Manufacturer's declaration in accordance with IEC 62040-3

| IEC 62040-3 Subclause | MODEL RATING (0.9 pf) | 60 kVA | 60-120 kVA | 180 kVA | 60-250 kVA |
|---|---|---|---|---|---|
| | Model catalogue reference | 93PM-XX(60) | 93PM-XXX(120) | 93PM-XXX(250) | |
| | Number of UPM's (Uninterruptible Power Modules) | 1 UPM | 1...2 UPM's | 3 UPM's | 1...4 UPM's |
| | UPS Options: | | | | |
| | Internal batteries, standard or long life | X | | | |
| | Internal Battery Breaker (BB) | Default | X | | |
| | Internal maintenance bypass (MBS) | X | X | | |
| | Top Cable Access (C) | X | X | Default | Default |
| | Plywood package | X | X | X | X |
| | Upgradeability | - | up to 120 kVA | up to 250 kVA | |
| | 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) | 560 x 914 x 1876 mm | | 760 x 914 x 1876 mm | |
| | UPS dimensions with top air exhaust (width x depth x height) | N/A | 560 x 1114 x 1876 mm | 760 x 1114 x 1876 mm | |
| | Shipping weight, UPS and internal batteries | UPS+0bat: 330 kg<br>UPS+5bat: 845 kg<br>UPS+6bat: 945 kg | 1 UPM: 337 kg<br>2 UPMs: 408 kg | 1 UPM: 378 kg<br>2 UPMs: 443 kg<br>3 UPMs: 508 kg | 1 UPM: 431 kg<br>2 UPMs: 496 kg<br>3 UPMs: 561 kg<br>4 UPMs: 626 kg |
| | Installed weight, UPS and internal batteries | UPS+0bat: 288 kg<br>UPS+5bat: 773 kg<br>UPS+6bat: 870 kg | 1 UPM: 267 kg<br>2 UPMs: 338 kg | 1 UPM: 279 kg<br>2 UPMs: 341 kg<br>3 UPMs: 438 kg | 1 UPM: 346 kg<br>2 UPMs: 408 kg<br>3 UPMs: 471 kg<br>4 UPMs: 556 kg |
| | UPS Cable entry | Bottom / rear entry<br>Top entry with optional kit | | Top / bottom / rear 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**

| | | | |
|---|---|---|---|
| 6.5.5 | Acoustic noise at 1m, in 25 °C ambient temperature | < 60 dBA in double conversion<br>< 47 dBA in ESS | < 65 dBA in double conversion<br>< 47 dBA in ESS |
| 4.1.4 | Ambient storage temperature range | | |
| | UPS | -25 °C to +55 °C in the protective package | |
| | Internal and External VRLA battery | -25 °C to +25 °C in the protective package*<br>**Recommended for optimized battery life time* | |
| 4.2.1.1 and 5.4.2.2 h | Ambient operating temperature range | | |
| | UPS | 0 to +35 °C<br>*The maximum rate of change shall be limited to 1.67 °C over 5 minutes (20 °C/hour), based on the ASHRAE standard 90.1-2013* | |
| | Internal and External VRLA battery | + 20 °C to + 25 °C recommended for optimized battery life time | |

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|---|---|---|---|---|---|
| 4.2.1.1 | Relative humidity range during storage and operation | 5 to 95%, no condensation allowed<br>*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 35 °C<br>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 | 60 kVA | 120 kVA | 180 kVA | 250 kVA |
| | 100% load | 96,1% | 96,3% | 96,3% | 96,3% |
| | 75% load | 96,5% | 96,6% | 96,6% | 96,6% |
| | 50% load | 96,6% | 96,7% | 96,7% | 96,7% |
| | 25% load | 96,2% | 96,1% | 96,1% | 96,2% |
| | Heat dissipation in double conversion, [W] | 60 kVA | 120 kVA | 180 kVA | 250 kVA |
| | 100% load | 2190 W | 4150 W | 6224 W | 8645 W |
| | 75% load | 1470 W | 2851 W | 4276 W | 5939 W |
| | 50% load | 950 W | 1843 W | 2764 W | 3839 W |
| | 25% load | 533 W | 1096 W | 1644 W | 2222 W |
| | No load | 366 W | 774 W | 1132 W | 1508 W |
| | Efficiency in ESS, rated linear load | 60 kVA | 120 kVA | 180 kVA | 250 kVA |
| | 100% load | 99,2% | 99,3% | 99,3% | 99,3% |
| | 75% load | 99,2% | 99,2% | 99,3% | 99,3% |
| | 50% load | 99,1% | 99,1% | 99,1% | 99,2% |
| | 25% load | 98,6% | 98,6% | 98,7% | 98,8% |
| | Heat dissipation in ESS | 60 kVA | 120 kVA | 180 kVA | 250 kVA |
| | 100% load | 435 W | 761 W | 1142 W | 1586 W |
| | No load | 128 W | 291 W | 382 W | 511 W |
| | Efficiency in stored energy mode, up to | 95,5 % | | | |

| **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<br>Rectifier input | rated voltage -15% / +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 72 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 | 0,99 at 100% load |

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|---|---|---|---|---|---|
| | | 60 kVA | 120 kVA | 180 kVA | 250 kVA |
| 5.2.2 c | Rated rectifier input current, 100% load without charging | 82 A | 164 A | 246 A | 341 A |
| 5.2.2 f | Maximum rectifier input current | 101 A | 202 A | 302 A | 420 A |
| | Rated Bypass input current | 87 A | 173 A | 260 A | 361 A |
| 5.2.2 h and 5.2.2. i | Input current distortion at rated input current Resistive load | < 3% | | | |
| | Non-linear load | < 5% (Up to 50kVA reference NL-load) | < 5% (Up to100kVA reference NL-load) | < 5 % | |
| 5.2.2 e | In-rush current | ≤ 145 A | ≤ 150 A | ≤ 180 A | ≤ 380 A |
| 5.2.2 k | AC power distribution system compatibility | TN, TT, IT (4-wire) | | | |
| | Rectifier ramp-up, at rectifier start and load step | 10 A/s (default), configurable. Minimum 1 A/s. | | | |
| | Backfeed protection | Yes, for rectifier and bypass lines | | | |

**ELECTRICAL CHARACTERISTICS**

**OUTPUT**

| | | | | | |
|---|---|---|---|---|---|
| 5.3.2 k | Output power rating | 60 kVA; 120 kVA; 180 kVA; 250 kVA | | | |
| | Output power factor | 0.9 | | | |
| 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 | | | |
| 5.3.2 f and 5.3.2 g | Number of output phases | 3 phase + neutral + PE | | | |
| | Crest factor | 1,8 | | | |
| 5.3.2 b | Rated output voltage | 220/380 V; 230/400 V; 240/415 V, configurable | | | |
| | Output voltage variation, steady state | < 1% | | | |
| 5.3.2 i | Total voltage harmonic distortion 100% linear load | < 1,5 % | | | |
| | 100% non-linear load | < 3 % *) *)Up to 50kVA reference NL-load | < 3 % *) *)Up to100kVA reference NL-load | < 3 % | |
| 5.3.2 q | Voltage unbalance at reference unbalanced load | < 0,6% | | | |
| | Phase displacement at reference unbalanced load | < 1,0 deg. | | | |
| 5.3.2 j | Voltage transient (r.m.s) and recovery time | 0% during transfer from stored energy to normal mode<br>±5% with 140 ms recovery from 100% load step | | | |
| 5.3.2 c | Rated output frequency | 50 or 60 Hz, configurable | | | |
| | Output frequency variation | ± 0,1 Hz | | | |
| 5.3.2 d and 5.3.2 e | Maximum frequency range for synchronization with bypass | ± 4 Hz as default. User settable ± 0,5 to ± 5 Hz. | | | |
| | Maximum synchronized phase error | < 1° with static balanced load | | | |
| | Maximum slew-rate when synchronizing | 0,4 Hz/s | | | |

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|---|---|---|---|---|---|
| 5.3.2 l | Overload capability<br>On inverter | 60 sec 101-105% load<br>10 sec 106-125% load<br>400 ms >125% load | | | |
| | Overload capability<br>On inverter, stored energy mode | 60 sec 101-105% load<br>400 ms >105% load | | | |
| 5.3.2 l | Overload capability<br>On bypass | Continuous < 115% load<br>10 ms 1000% load | | | |
| 5.3.2 m | Output current limitation, short-circuit capability | 60 kVA<br>170 A, 400 ms | 120 kVA<br>345 A, 400 ms | 180 kVA<br>510 A, 400 ms | 250 kVA<br>670 A, 400 ms |
| 6.4.2.10.3 and 6.4.2.10.4 | Fault clearing capability | 35 A gL/gG fuse / B25/C10 circuit breaker | 35 A gL/gG fuse /B50/C25 circuit breaker | 63 A gL/gG fuse /B63/C32 circuit breaker | 63 A gL/gG fuse /B100/C50 circuit breaker |

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

| 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 80%, VMMS will automatically optimise the number of online modules for optimised operating efficiency.<br>The extra UPMs will be set to ready state mode, capable to transfer online in < 2ms transfer time.<br>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.<br>Enabled by default, configurable. |

| BYPASS | | | | |
|---|---|---|---|---|
| | Type of bypass | Static | | |
| | Static Bypass rating | 60 kVA | 120 kVA | 250 kVA |
| | Static Bypass voltage range | 220/380 V; 230/400 V; 240/415 V<br>tolerance -10% / +10% of rated voltage | | |
| | Transfer time break | No break | | |
| | Maintenance bypass | Option, internal or external | | Option, external |
| | Backfeed protection | Integrated as standard | | |

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|---|---|---|---|---|---|
| | Rated conditional short-circuit current, Icc Static bypass | 100 kA (internal ultra rapid fusing) | | | |
| | Optional internal Maintenance bypass | 10 kA* | 25 kA* | N/A | |
| | | *using external protective fuse | | | |
| | Internal static bypass ultra-rapid fuse | Bussmann 160LET | Bussmann 550 A 170M4465 | Bussmann 900 A 170M4419 | |
| | Bypass fuse $i^2t$ value<br>Pre-arc $i^2t$<br>Total clearing $i^2t$ | <br>1 100 $A^2s$<br>16 000 $A^2s$ | <br>96 100 $A^2s$<br>230 000 $A^2s$ | <br>155 000 $A^2s$<br>850 000 $A^2s$ | |
| | External bypass protective fuse, recommended rating | 60 kVA | 120 kVA | 180 kVA | 250 kVA |
| | 3x | 125 A | 250 A | 315 A | 400 A |

| BATTERY CHARACTERISTICS | | | | | |
|---|---|---|---|---|---|
| 5.4.2.2 d | Battery technology | 12 V, VRLA | | | |
| 5.4.2.2 b | Battery quantity, internal batteries | 36 blocks, 216 cells per battery string | N/A | | |
| | | *Note! Units with internal batteries only support 36 block string length* | | | |
| | Battery quantity, external batteries | 36 ... 40 blocks, 216...240 cells per string | 40 blocks, 240 cells per battery string | | |
| | | *Note! Never connect battery strings with different battery quantity and voltage in parallel* | | | |
| 5.4.2.2 c | Battery voltage, internal batteries | 432 V (36 blocks) | N/A | | |
| | Battery voltage, external batteries | 432 V (36 blocks) ... 480 V (40 blocks) | 480 V (40 blocks) | | |
| 5.4.2.2 o | Recharge profile | Advanced Battery Management (ABM®) = 90% resting,10% 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 9 A per UPM | | | |
| | Battery start | Yes | | | |
| | Temperature compensated battery charging option | Yes, standard for internal batteries Yes, with Environmental Monitoring Probe (EMP) for external batteries | | | |
| | 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/Modbus, Industrial relay card |
| | Complete list of indications and interface devices | See User's Manual |

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|---|---|---|---|---|---|
| **COMPLIANCE WITH STANDARDS** | | | | | |
| IEC 62040-1 | Safety Access | Restricted access | | | |
| | Degree of protection | IP20; protection against medium sized foreign matter (incl. finger)<br>IP21 available as option | | | |
| IEC 62040-2 | Electromagnetic Compatibility<br>Immunity and Emissions | EMC Category C3 | | | |