# Eaton 5PX

## 1000-3000VA Rack-Tower

## Guide Specification

### 1.1 Summary

This specification shall define the electrical and mechanical characteristics and requirements for a line-interactive, single phase, uninterruptible power system (UPS). The UPS shall provide high-quality AC power for sensitive electronic equipment loads.

### 1.2 Standards

The UPS shall be designed in accordance with applicable sections of the current revision of the following documents.

100V/120V/127V Units

- UL Standard 1778, c-UL
- UL, cUL
- IEEE ANSI C62.41 Category A2
- FCC CFR 47 part 15 Subpart B ClassA
- IEC 62040-3
- IEC 61000-2-2
- IEC 61000-4-2
- IEC 61000-4-3
- IEC 61000-4-4
- IEC 61000-4-5
- IEC 61000-4-6
- IEC 61000-4-8
- IEC 61000-4-11
- IEC 61000-4-12
- IEC 61000-4-13
- IEC 60068-2-64
- IEC 60068-2-27
- IEC 60068-2-31

200V/208V/220V/230V/240V Units

- EN62040-1:2008
- CE compliance mark
- C-Tick
- EN62040-2(C1):2006
- TUV, TUVUS
- CISPR 22 Class B
- IEC 61000-3-2
- IEC 61000-3-3
- IEC 62040-3
- IEC 61000-2-2
- IEC 61000-4-2
- IEC 61000-4-3
- IEC 61000-4-4
- IEC 61000-4-5
- IEC 61000-4-6
- IEC 61000-4-8
- IEC 61000-4-11
- IEC 61000-4-12
- IEC 61000-4-13
- IEC 60068-2-64
- IEC 60068-2-27
- IEC 60068-2-31

### 1.3 System Description

#### 1.3.1 Modes of Operation

The UPS shall be designed to operate as a pure sinewave line-interactive system in the following modes:

A. Normal – In normal operation incoming AC power is passed through to the load and monitored for quality. If the voltage goes out of range the UPS will automatically switch into AVR mode where the output voltage will be either bucked or boosted to appropriate levels of operation
B. Auto Voltage Regulation (AVR) – When voltage levels go above or below the threshold levels the UPS will either buck or boost the output voltage to keep it within specified parameters.
C. Battery – When input power is insufficient to be adjusted by AVR mode or upon utility power failure, the critical AC load shall be supplied by the inverter, which obtains power from the battery. There shall be no interruption in power to the critical load upon failure or restoration of utility power.
    a. Cold Start capable
    b. Battery deep discharge protection
    c. Automatic inverter shutdown at now load capable
    d. Battery Test
D. Recharge – Upon application of utility AC power or after restoration of utility power after an outage the input convertor will automatically restart and begin supplying power to the inverter and the battery charger to recharge the battery
    a. Charger works in when input switch is off
    b. Protection against overvoltage

### 1.3.2 Design Requirements

A. Topology – Line Interactive
B. Waveform – Pure Sinewave
C. Input Voltage Range off Battery
    - 120V: 89-151 VAC
    - 208V: 160-263 VAC
    - 230V: 160-294 VAC
D. Frequency – 50/60Hz Auto Sensing
E. Frequency Range
    - 50Hz: 47-70Hz
    - 60Hz: 56.5-70Hz
F. Output (User configurable)
    - 120V units: 110/120/127
    - 208/230V units: 200/208/220/230/240
G. Output Load Capacity

| Model | VA | Wattage (W) |
|---|---|---|
| 5PX1000RT | 1000 | 1000 |
| 5PX1500RT | 1440 | 1440 |
| 5PX2200RT | 1950 | 1920 |
| 5PX3000RT2U | 3000 | 2700 |
| 5PX3000RT3U | 3000 | 2700 |
| 5PX1500iRT | 1500 | 1350 |
| 5PX2200iRT | 2200 | 1980 |
| 5PX3000iRT2U | 3000 | 2700 |

H. Internal Battery – Valve-regulated, non-spillable, lead acid cells, maintenance free
I. Battery replacement – Hot swappable internal batteries
J. Advanced Battery Management – The UPS will provide Advanced Battery Management that uses sophisticated sensing circuitry and a three-stage charging technique that extends the used service life of the UPS batteries while optimizing the battery recharge time. Additionally, the UPS should be able to provide up to 60 days' notice of the end of useful battery service live to aid in scheduling of battery replacement

K. Efficiency – Line mode efficiency will have minimum values as stated below

| | Load % | | |
|---|---|---|---|
| | 50% | 75% | 100% |
| 5PX1000RT | 95% | 97% | 98% |
| 5PX1500RT / 5PX1500iRT | 96% | 98% | 98% |
| 5PX2200RT / 5PX2200iRT | 98% | 98% | 99% |
| 5PX3000RT2U / 5PX3000iRT2U | 98% | 99% | 99% |
| 5PX3000RT3U | 98% | 99% | 99% |

L. Runtime will meet the minimum requirements at the given loads.

| | Load (W) | Minimum runtime (min) |
|---|---|---|
| 5PX1000RT | 900 | 8 |
| 5PX1500RT / 5PX1500iRT | 1300 | 4 |
| 5PX2200RT / 5PX2200iRT | 1920 | 3 |
| 5PX3000RT2U / 5PX3000iRT2U | 2700 | 4 |
| 5PX3000RT3U | 2700 | 4 |

M. Switched Load Segments – The UPS will provide switched load segments that provide the capability to do sequenced startup and load shedding of attached devices.

N. Managed Load Segments – The UPS will provide detailed power consumption measurements for each individual managed load segment.

O. Auto Battery Test – The UPS will perform an auto battery test with a factory default set at once per week to determine the overall health of the battery. This interval should be settable to select either no test, every day, every week, or every month.

P. Accessories
   - The UPS will have a compatible maintenance bypass switch.
   - The UPS will have the ability to add up to 4 Extended Battery Modules (EBM). The UPS will be able to auto detect the number of attached EBM's with RJ-11 cable included.

### 1.4 Communications Options

#### 1.4.1 Network Communications

The UPS shall include one communications slot that will allow the operator to field install an optional network communications card [Eaton Network Card-MS or equivalent]. The network communications card must be hot-installable. Minimum features are described below.

- Communicates with SNMPv3 and IPv6
- Supports IETF UPS MIB
- Supports redundant UPS configurations
- Allows control of UPS managed load segments
- Manual and scheduled on/off controls of UPS
- Capable of mass firmware upgrades
- Capable for mass configuration

#### 1.4.2 RS232 serial communication

The UPS will provide a RS232 serial connection. Cable provided to provide DB-9 interface

#### 1.4.3 USB

The UPS will provide a USB connection that is HID compliant for network connection

#### 1.4.4 RPO / ROO (Remote Power Off / Remote On/Off)

The UPS will provide both Remote Power Off and Remote On/Off capability.

- Remote Power Off – Allow a remote contact to be used to disconnect power to the UPS and all devices attached. Restarting the UPS requires manual intervention.
- Remote On/Off – Allows remote contact to be used to turn the UPS On and Off.

### 1.5 Management Software

The UPS will be compatible with power management software [Eaton Intelligent Power Software Suite (IPSS) or equivalent]. This software will perform the following actions:

- Monitors power consumption at the load segment level
- Support redundant UPS configuration
- Lightweight software, not running in JRE
- Performs mass configurations on alarms, alert notifications and shutdown parameters
- Mass update of network card firmware

- Plugs into dashboard of major Virtualization players. Allows for monitor of power equipment through the same dashboard that the Virtualized data center uses.
- Triggers movement of virtual machines to avoid shutdown of server facing imminent power disruption

### 1.6 Warranty

The UPS will have a warranty that covers both the UPS and the internal batteries for 3 years with product registration.

### 1.7 Display and Controls

The UPS shall be provided with a full graphical LCD display that provides the information and access to all settings and control features of the UPS.

#### 1.7.1 Input Controls

Controls will consist of a 5 button configuration including:

A. ESC – Exit menu item / cancel changes
B. UP – Go to previous screen or menu/value selection
C. DOWN – Go to next screen of menu/value selection
D. ENTER – Enter menu or select value
E. On/Off Button

#### 1.7.2 Status Screen

The main status screen shall include all the following information at a single view:

A. UPS mode status
B. Load information:
    a. Load Wattage
    b. Load VA
    c. Load Percentage
    d. Graphical representation of load %
C. Battery Condition
    a. Battery Charge Percentage
    b. Estimated Runtime
    c. Number of EBM's connected
    d. Graphical representation of battery %
D. Alert / Alarm conditions
E. Efficiency
F. Load Segment Status

### 1.7.3 Measurements, Controls and Settings

All controls and settings of the UPS will be accessible through the LCD display. These will include:

*Measurements* – Total Load, Load (Primary), Load (Group 1), Load (Group 2), Input/Output Voltage and Frequency, Battery Condition, Efficiency, Power Consumption Total/Primary, Power Consumption Group1/Group2

*Control* – Load segment control, Battery Test, Reset fault state, Reset factor settings, Reset power usage

*Settings* – Local Settings, Input and Output Settings, On/Off settings, Battery Settings

*Fault Log* – Fault list, Reset Fault log

*Identification* – Product Type/Model, Part/Serial #, UPS/NMC Firmware revision, COM card IPv4, COM card IPv6, COM card MAC

## 1.8 Environmental conditions

A. Temperature
   - Storage: -15°C to 40°C
   - Operation: 0°C to 40°C

B. Relative Humidity
   - Storage: 0% to 95% non-condensing
   - Operation: 0% to 95% non-condensing

C. Audible Noise
   - On utility power fully charged: <40dBA
   - On AVR mode: <45dBA
   - On battery mode: <45dBA

### 1.9 Mechanical features

The UPS configuration will provide both rack and tower mounting options. For the rack configurations rail kits and mounting hardware will be included. For tower configuration stabilizing feet will be included.

All additional input and output connections, dimensions and weights shall follow in the table below.

| Catalog Number | Input connection | Output receptacles | Dimensions H x W x D in | Net Weight lbs |
|---|---|---|---|---|
| **120V, 50/60 Hz** | | | | |
| 5PX1000RT | 5-15P (8ft) | (8) 5-15R | 3.4 x 17.4 x 20.6 | 62 |
| 5PX1500RT | | | | 65 |
| 5PX2200RT | 5-20P (8ft) | (8) 5-20R | | 65 |
| 5PX3000RT2U | L5-30P (10ft) | (1) L5-30R<br>(6) 5-20R | 3.4 x 17.4 x 25.4 | 87 |
| 5PX3000RT3U | | | 5.1 x 17.4 x 19.6 | 86 |
| **230V, 50/60 Hz** | | | | |
| 5PX1500iRT | C14-10A | (8) C13-10A | 3.4 x 17.4 x 20.6 | 61 |
| 5PX2200iRT | C20-16A | (1) C19-16A<br>(8) C13-10A | | 63 |
| 5PX3000iRT2U | | | 3.4 x 17.4 x 25.4 | 84 |

| Extended Battery Modules | For use with | Max qty / UPS | Dimensions H x W x D in | Net Weight lbs |
|---|---|---|---|---|
| 5PXEBM48RT | 5PX1000RT<br>5PX1500RT<br>5PX2200RT | 4 | 3.4 x 17.4 x 20.6 | 72 |
| 5PXEBM72RT2U | 5PX3000RT2U | | 3.4 x 17.4 x 25.4 | 102 |
| 5PXEBM72RT3U | 5PX3000RT3U | | 5.1 x 17.4 x 19.6 | 98 |