# Eaton 5PX G2

## 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/110/120V/125V Units

- Standard 1778, c-UL
- cTUVus mark
- EnergyStar 2.0 and DoE compliant
- IEEE ANSI C62.41 Category A2
- FCC CFR 47, part 15 Class B
- NOM -001-SCFI-2018
- NOM-I-163-NYCE-2016
- RoHS3
- UL1778:2014
- CSA C22.2 No. 107.3
- EN IEC 62040-1
- EN IEC 62040-2
- EN 61000-3-11
- EN 61000-3-12
- BSMI (select models)
- DCTY EN 62040-1
- DCTY EN 62040-2
- CISPR 32
- IEC 61000-3-2
- IEC 61000-3-3
- IEC 62040-3
- IEC 61000-3-11
- IEC 61000-3-12
- 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 61000-4-12
- IEC 60068-2-64
- IEC 60068-2-27
- IEC 60068-2-31

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

- cTUVus mark
- CE compliance mark
- EnergyStar 2.0
- EN62040-2
- NOM
- UKCA (select models)
- BSMI (select models)
- RCM
- CISPR 22 Class B
- RoHS3
- UL1778:2014
- CSA C22.2 No. 107.-14 + GI1
- EN IEC 62040-1
- EN IEC 62040-2
- EN61000-3-11
- EN61000-3-12
- EN 62040-2
- DCTY EN 62040-1
- DCTY EN 62040-2
- CISPR-32
- IEC 61000-3-2
- IEC 61000-3-3
- IEC 62040-3
- IEC 61000-3-11
- IEC 61000-3-12
- 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 61000-4-12
- 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 Normal Mode 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 (After initial AC power ON cycle)
   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
   - 100-125V: 80-151 VAC (adjustable to 70-153V)
   - 208V: 160-266 VAC (adjustable to 150-294V)
D. Frequency – 50/60Hz Auto Sensing
E. Frequency Range
   - 50Hz: 46-70Hz
   - 60Hz: 57-70Hz
F. Output (User configurable)
   - 120V units: 100/110/120/125V
   - 208V units: 200/208/220/230/240V
G. Output Load Capacity

| Model | VA | Wattage (W) |
|---|---|---|
| 5PX1000RTG2<br>5PX1000RTNG2 | 1000 | 1000 |
| 5PX1500RTG2<br>5PX1500RTNG2 | 1440 | 1440 |
| 5PX1500HRTG2 | 1500 | 1500 |
| 5PX2000RTG2<br>5PX2000RTNG2 | 1950 | 1950 |
| 5PX2000RT3UNG2 | 1950 | 1950 |
| 5PX2200HRTG2 | 2200 | 2200 |
| 5PX3000HRTG2<br>5PX3000HRTNG2<br>5PX3000RTG2<br>5PX3000RTNG2 | 3000 | 3000 |
| 5PX3000RT3UNG2 | 3000 | 3000 |

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% |
| 5PX1000RTG2/5PX1000RTNG2 | 98% | 98% | 98% |
| 5PX1500RTG2 / 5PX1500RTNG2 / 5PX1500HRTG2 | 98% | 98% | 98% |
| 5PX2000RTG2 / 5PX2000RTNG2 | 98% | 98% | 98% |
| 5PX2200HRTG2 | 98% | 98% | 98% |
| 5PX3000HRTG2 / 5PX3000HRTNG2 | 98% | 98% | 98% |
| 5PX3000RTG2 / 5PX3000RTNG2 | 98% | 98% | 98% |
| 5PX3000RT3UNG2 | 98% | 98% | 98% |

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

| | Load (W) | Minimum runtime (min) |
|---|---|---|
| 5PX1000RTG2 / 5PX1000RTNG2 | 1000 | 6 |
| 5PX1500HRTG2 / 5PX1500RTG2 / 5PX1500RTNG2 | 1440 | 5 |
| 5PX2000RT3UNG2 | 1950 | 4 |
| 5PX2000RTG2 / 5PX2000RTNG2 / | 1950 | 4 |
| 5PX2200HRTG2 | 2200 | 3 |
| 5PX3000HRTG2 / 5PX3000RTG2 / 5PX3000RTNG2 | 3000 | 3 |
| 5PX3000RT3UNG2 | 3000 | 3 |

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.

Optional Accessories

| Catalog Number | Description |
|---|---|
| 102007018-5591 | Two-post rack mounting kit (supports 2U models only) |
| RK4PRS | Ship-in-rack 4-post rail kit (required to ship 5PX G2 while mounted in a rack on a shock pallet |
| NETWORK-M2 | Gigabit Network Card |
| INDGW-M2 | Industrial Gateway Card (Modbus + Relays + Network Management |
| RELAY-MS | Relay / Serial Interface Card |
| EMPDTH1C2 | Environmental Monitoring Probe (EMP) Gen 2 for use with NETWORK-M2 or INDGW-M2 |
| EBMCBL48RT | 5PX G2 2M EBM extension cable for 48V EBMs (use with 1-1.5kVA models) |
| EBMCBL72 | 5PX G2 2M EBM extension cable for 72V EBMS (use with 2-3kVA models) |

### 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-M2 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 Eaton power management software suite [Eaton Intelligent Power Software 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, control features of the UPS, and at-a-glance LED status bar for quick and easy status updates.

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

**1.7.3** LED Status Bar

The LED status bar shall include all the follow indications for a quick at-a-glance view of unit status:

A. Blue (Nominal) – Normal operation
B. Blinking Blue (Warning) – Your attention is needed
C. Red (Alarm) – A critical issue needs your immediate attention and action
D. Blinking Red (Fault) – A critical issue needs your immediate action

### 1.7.4 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, Average Power Consumption Total/Primary, Group1/Group2, Cumulative Power Consumption Total, Since Primary, Since Group1/Since Group2

*Control* – Load segment control, Battery Test, Change battery, Connectivity test, Reset fault state, Restore factory settings, Reset power usage, Reset battery life, Card reset,

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

*Event Log – View alarms, events, View all events and faults stored, clear all fault and events stored*

*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

*Registration* – Links to Eaton registration website

## 1.8 Environmental conditions

A. Temperature
   - Storage: -15°C to 50°C
   - Operation: 0°C to 40°C

B. Relative Humidity
   - Storage: 20% to 95% non-condensing
   - Operation: 20% to 95% non-condensing

C. Audible Noise
   - On utility power fully charged: <40dBA
   - On AVR mode: <45dBA
   - On battery mode: <45dBA, 50dBA for 3K

### 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 mounting options can be purchased separately.

| Catalog Number | Description |
|---|---|
| 102007018-5591 | Two-post rack mounting kit (supports 2U models only) |
| RK4PRS | Ship-in-rack 4-post rail kit (required to ship 5PX G2 while mounted in a rack on a shock pallet |

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** | | | | |
| 5PX1000RTG2<br>5PX1000RTNG2 | 5-15P (10ft) | (8) 5-15R | 3.4 x 17.4 x 20.6 | 62 |
| 5PX1500RTG2<br>5PX1500RTNG2 | | | | 65 |
| 5PX2000RTG2<br>5PX2000RTNG2 | 5-20P (10ft) | (8) 5-20R | | 65 |
| 5PX3000RTG2<br>5PX3000RTNG2 | L5-30P (10ft) | (1) L5-30R<br>(6) 5-20R | 3.4 x 17.4 x 25.4 | 87 |
| 5PX3000RT3UNG2 | | | 5.1 x 17.4 x 19.6 | 86 |
| **208/230V, 50/60 Hz** | | | | |
| 5PX1500HRTG2 | C14-10A | (8) C13-10A | 3.4 x 17.2 x 17.6 | 49 |
| 5PX2200HRTG2 | C20-16A | (2) C19-16A<br>(8) C13-10A | 3.4 x 17.2 x 20.6 | 62 |
| 5PX3000HRTG2<br>5PX3000HRTNG2 | | | 3.4 x 17.2 x 23.7 | 70 |

| Extended Battery Modules | For use with | Max qty / UPS | Dimensions H x W x D in | Net Weight lbs. |
|---|---|---|---|---|
| 5PXEBM48RTG2 | 5PX1000RTG2<br>5PX1000RTNG2<br>5PX1500RTG2<br>5PX1500RTNG2<br>5PX1500HRTG2 | 4 | 3.4 x 17.2 x 17.6 | 61 |
| | 5PX2000RTG2<br>5PX2000RTNG2<br>5PX3000RTG2 | | 3.4 x 17.2 x 23.7 | 89 |

| | | | | |
|---|---|---|---|---|
| 5PXEBM72RTG2 | 5PX3000RTNG2<br>5PX2200HRTG2<br>5PX3000HRTG2 | | | |
| 5PXEBM72RT3UAG2 | 5PX2000RT3UNG2<br>5PX3000RT3UNG2<br>5PX3000HRTNG2 | | 5.1 x 17.2 x 19 | 88 |