

Best Practices for Deploying Smart-UPS®, Smart-UPS® On-Line, and Symmetra®

Abstract

The Smart-UPS, Smart-UPS On-Line, and Symmetra uninterruptible power supplies (UPS) protect hardware, software and data from power disturbances throughout the world. Designed to prevent blackout, brownouts, surges and sags from reaching your IT devices and other valuable electronic equipment, Smart-UPS, Smart-UPS On-Line, and Symmetra provide continuous power from its internal battery until the utility line is restored to a safe level. This application note covers best practices for deploying a Smart-UPS, Smart-UPS On-Line, or Symmetra as well as environmental constraints.

Introduction

The Smart-UPS, Smart-UPS On-Line, or Symmetra products are high-performance; line interactive and double conversion on-line uninterruptible power supplies (UPS) designed to provide clean, reliable AC power to servers, voice and data networks. Proper configuration and use greatly enhances the UPS performance considerably increasing reliability and availability of the power protection system as a whole. The UPS requires proper ventilation and a climate controlled environment in order to extend service life.

Unit Placement

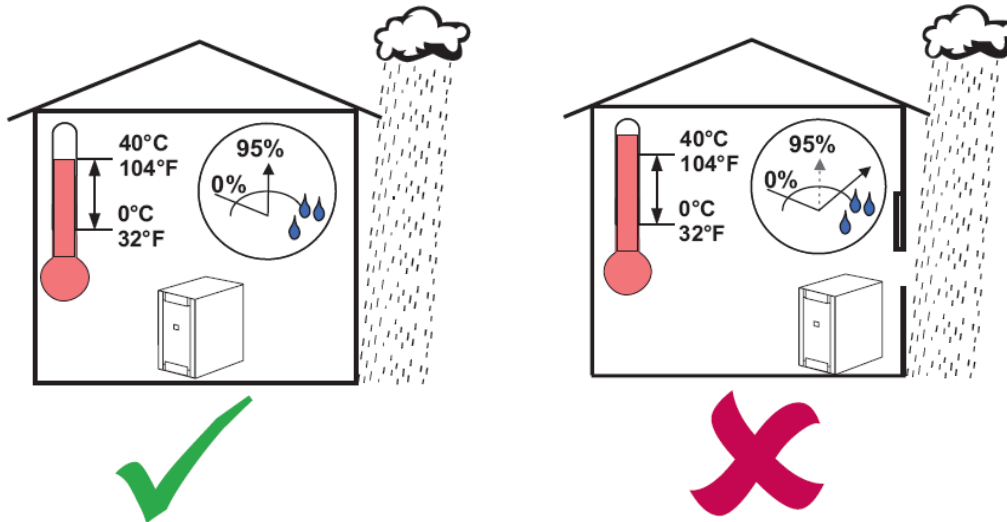
When installing a UPS, the user must determine where to install the unit to best provide power protection of the IT equipment in the room. It is recommended that the UPS be installed in an environment similar to the devices it is protecting. The environment should be free of excessive dust and corrosive fumes. Do not operate the UPS where the temperature and humidity is outside the specified limits. The ventilation openings at the front, side or rear of the unit must not be blocked. The single most important factor is the ambient operating conditions. The values provided in **Table 1** represent the ideal environment to achieve best performance. The goal should be to maintain temperatures no higher than 77°F (25°C). However, in cases where this is not possible, maintaining below the maximum allowable temperature of 90°F (32°C) can be a suitable solution for less critical applications. Any temperature above 90°F (32°C) should be avoided to reduce risk of equipment failure. Further discussion on cooling strategies can be found in APC White Paper #68, "[Cooling Strategies for IT Wiring Closets and Small Rooms](#)".

Table 1 – Recommended environment

Environmental Condition	Smart-UPS, Smart-UPS On-Line, or Symmetra
Recommended ambient room temperature	0°C to 40°C (<25° C ideal)
Operating and storage relative humidity	0 to 95%, non condensing
Clearance	30cm, front and back

The UPS should not be placed near open windows or areas that contain high amounts of moisture. Placement of the UPS can influence the UPS's performance as shown in **Figure 1**.

Figure 1 – UPS placement



Battery Characteristics of Smart-UPS, Smart-UPS On-Line, or Symmetra Battery Modules

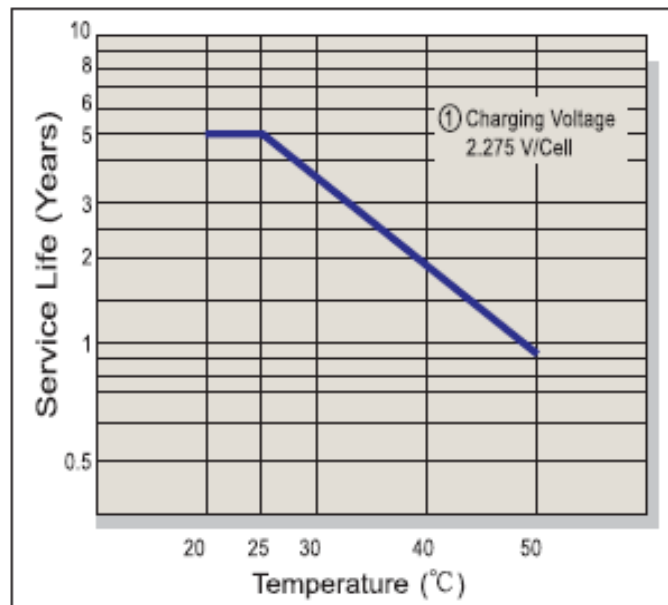
The Smart-UPS, Smart-UPS On-Line, or Symmetra battery system is comprised of user replaceable, hot swappable, battery modules. The battery cells housed within each removable battery module are of the Valve Regulated Lead Acid (VRLA) type. The VRLA batteries are rechargeable and are designed to provide a high degree of overcharge and discharge protection, the intelligent battery management system contains a temperature monitoring circuit and compensation algorithm that regulates the battery charging current so as to optimize battery life. The battery charging circuit remains active when in bypass and online states. For applications requiring uninterrupted operation during extended power faults, additional battery modules may be added to increase runtime. The Symmetra models allow for up to four internal battery modules and a maximum of

seven external frames. Smart-UPS models allow for a maximum of ten additional battery packs. All Smart-UPS and Symmetra internal and external battery modules and frames are hot-pluggable, allowing for easy and quick installation or replacement without the need for electrical wiring, electrician services or powering down of the UPS.

As shown in **Table 1** the ambient operating temperature is quite wide, however to prevent deterioration of service life and maintain the highest available capacity, the preferred ambient operating temperature is 25°. Battery life is also dependent on the depth and number of discharges, also known as cycle life. The deeper the discharge, the shorter the cycle life, the cycle life of the battery is also related to such factors as the type of battery, ambient temperature, and the rest period between charge and discharge. Cycle times can vary according to actual operating conditions.

Discharge capability of the UPS batteries may also decrease during repetitive discharges and varies with ambient temperature as shown in **Figure 2**. For operating temperatures between 0°C to 30°C, the battery life is typically 3 to 6 years. For operating ambient temperatures between 30°C to 40°C, the battery life is approximately 2 to 3 years. Continual operation at temperatures +40°C will limit battery life to approximately 1 to 2 years.

Figure 2 – Trickle (or float) service life



The battery voltage is maintained at a constant level for maximum battery life. The UPS's battery charger operates continuously whenever the UPS is connected to AC power and the utility voltage is within normal range. The charge characteristics of the Smart-UPS and Symmetra models are within the battery manufacture's specifications. Characteristics may vary if 3rd party batteries are utilized.

Conclusion

The guidelines provided in this application note assist with the best practices for deploying a UPS. When the ambient temperature outside is uncontrolled, or contaminated, the UPS should be placed in locations with stable environmental characteristics with adequate ventilation and controlled temperatures. Excessive heat and dust has a large impact on failures and can degrade your equipment.