Chapter 10
Uninterruptible Power Supply Systems

INTRODUCTION

Recently, there has been a sharp increase in a number of so-called critical equipment of electrical power. Both separated units and complex objects, whose normal operation is strongly influenced by the parameters of electrical power, are included in this equipment.

The critical equipment includes the following objects:

- Personal computers (PC) and computer systems
- Electrical equipment for continuous technological processes
- Hospitals and other medical objects with modern furnishing
- Communicational system and equipment
- Security services and alarm systems
- Land aircraft equipment
- Fire-security
- Military objects

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At contemporary practice, the normal operation of critical equipment is secured by separated parts of equipment or whole systems. This equipment is fed by electrical energy delivered from public distribution electrical systems with a common level of power quality and with special methods and means for improving the electrical supply quality to a level required for the normal operation of the critical equipment. These special methods and means applied in devices are received popularity as “UPS” (Uninterruptible Power Supplies).

This name is originally connected only with a definite structure of the supplies, but along with the UPS development it is enhanced - Uninterruptible Power Supply Systems (Griffith, 1989; Emadi, 2005; Gurrero, 2007).

Users more often associate the installation of UPS to a necessity to secure an operation of a responsible consumer at a drop off of the source voltage. Different changes in the quality of the source voltage are possible in practice. More often these changes are:

1. A drop off for a long time – Figure 1.
2. A drop off for a half-period or period of the source voltage – Figure 2.
3. A decrease of the source voltage value below a permissible one – Figure 3.
4. An increase of the source voltage value above a permissible one – Figure 4.
5. A change of the source frequency – Figure 5.
6. Transient overvoltages – Figure 6.

Figure 1. A drop off of the source voltage for a long period of time

Figure 2. A drop off of the source voltage for a half-period or a period