

## Offline UPS

The offline offers only the most basic features, providing surge protection and battery backup. The protected equipment is normally connected directly to incoming utility power. When the incoming voltage falls below or rises above a predetermined level the UPS turns on its internal DC-AC inverter circuitry, which is powered from an internal storage battery. The UPS then mechanically switches the connected equipment on to its DC-AC inverter output. The switchover time can be as long as 25 milliseconds depending on the amount of time it takes the standby UPS to detect the lost utility voltage. The UPS will be designed to power certain equipment, such as a personal computer, without any objectionable dip to that device.

## Line Interactive UPS

The line-interactive UPS is similar in operation to a standby UPS, but with the addition of a multi-tap variable-voltage Autotransformer. This is a special type of transformer that can add or subtract powered coils of wire, thereby increasing or decreasing the magnetic field and the output voltage of the transformer. This may also be performed by a buck-boost transformer which is distinct from an autotransformer, since the former may be wired to provide galvanic isolation.

## On line/Double Conversion UPS

The online UPS is ideal for environments where electrical isolation is necessary or for equipment that is very sensitive to power fluctuations. Although it was at one time reserved for very large installations of 10 kW or more, advances in technology have now permitted it to be available as a common consumer device, supplying 500 W or less. The initial cost of the online UPS may be higher, but its total cost of ownership is generally lower due to longer battery life. The online UPS may be necessary when the power

environment is "noisy", when utility power sags, outages and other anomalies are frequent, when protection of sensitive IT equipment loads is required, or when operation from an extended-run backup generator is necessary.

The basic technology of the online UPS is the same as in a standby or line-interactive UPS. However it typically costs much more, due to it having a much greater current AC-to-DC battery-charger/rectifier, and with the rectifier and inverter designed to run continuously with improved cooling systems. It is called a *double-conversion* UPS due to the rectifier directly driving the inverter, even when powered from normal AC current.