ETA Systems
Technical Tip #5101

How to Calculate Power Conditioning and UPS Size Requirements

It is sometimes be difficult to select a UPS or power conditioner for a given application. Selecting the proper size is important since purchasing a power conditioner or UPS that is larger than required means money spent unnecessarily for a product that is larger than the job requires.

There are two ways of determining the power consumption of an audio or video system component, computer based editing system, console or computer control. The first is to actually measure the power consumption of the device while it is operating. Because modern electronic power supplies are non-linear energy consumers, this method requires a true RMS current meter and current probe Most of the time, this equipment is not readily accessible, and a simpler method must be utilized.

On the rear of every electrical device, near where the power cord enters the chassis, will be found an electrical nameplate. The nameplate will provide a variety of electrical information with respect to the power consumption of the device. Typically this data includes the input voltage, input frequency, and input current. This data is usually provided for both North American and international electrical environments. The nameplate may also include power consumption in either watts or VA (volt-amps) or both. The data may be appear as in the following example.

Model XX-XX-XXXX

Input 120/230 volts
50/60 Hz. Amps 3/1.6
360VA/234 watts 245 BTU/Hr.

Nameplate data is usually moderately overstated, so one simple way of selecting an appropriately sized power conditioner is to simply select a model that provides at least as much current as that shown on the nameplate. If multiple devices are being connected to the same power conditioner, then simply add the nameplate amperages together and select a power conditioner model with the amperage total of all the devices. Sometimes no amperage is stated, and power consumption is given only in VA or volt-amps. If this is the case, divide the VA by the operating voltage to determine the current. For example, a system with a VA rating of 360 VA operating at 120 volts would require 3 amps. If growth is anticipated, select the next larger size conditioner

Infrequently, power consumption is shown only in watts and neither VA nor amperage is available. Watts ratings are an expression of the "true" power consumed by a device and are equal to the VA rating multiplied by the system's power factor. Most electronic systems today operate at power factors of about .65 or 65% of the VA rating. If you encounter a system with its power rating shown only in watts, do the following. Multiply the watt rating by 1.5 to arrive at the approximate VA rating and then divide the VA rating by the voltage to arrive at the amperage required.

There is one additional item to keep in mind. Manufacturers of uninterruptible power supplies usually do not rate their products in amps. UPS products are generally rated in either VA or watts or both. It's preferable to select a UPS on the basis of its VA capacity and the VA requirements of the system it will support as this eliminates the need to perform the amperage calculation. However, if selecting the UPS on the basis of only the system's watt rating is unavoidable, make sure that the UPS provides all the wattage the load requires. Most UPS specifications provide the UPS capability in both VA and watts. With a UPS, make sure to select a size that will allow for growth if adding more load is anticipated.

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