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Power Supplies...the forgotten component

Nearly every system we do involves a power supply of some type, from the humble 16vAC plug pack with an alarm panel, all the way through to 20Amp rack mounted power supplies. A constant failing in system design is not allowing enough power. Be it not enough supplies, the wrong type of supplies or not enough battery backup.

DC type power supplies fall into 2 broad categories, switch mode or linear. In general switch mode supplies are cheaper, but linear supplies are superior for our applications.

Switch mode supply:

A switch mode power supply is basically a supply which is 'over voltage' and is *switched* off and on fairly quickly to generate the required voltage by averaging the supplied voltage. Eg 16v for ¾ of the time and 0V for ¼ averages out at 12v. The advantage of this is that the supply components, including the transformer can be down rated as they are not always on. The disadvantages include that these supplies are inherently electrically noisy due to the switching and also tend to have a larger ripple. The ripple is how much variation there is on the DC supply voltage. A ripple of 0.05v is insignificant, but a ripple of 0.5v is. The electrical noise means they can interfere with RF type devices like proximity readers. Also when a large percentage of the load is removed from a switch mode supply the supply voltage tends to spike up significantly for a short period of time eg when a few locks are de energised simultaneously.

Linear mode supply:

A linear supply is a constant DC supply clamped down to the supply voltage. These power supplies are much cleaner electrically (no high frequency noise). They also have much lower ripple. As these supplies constantly supply the required voltage (no switch on / off) they are more stable over varying loads. The major disadvantages of linear power supplies is that they are more expensive, are normally much larger and generate more heat.

In general 30% should be allowed as overhead in power supply capacity eg a 2.5Amp power supply should not be used for a load greater than 1.75Amp. This allows for a little system growth and ensures that the supplies are not overloaded with initial rush current.

Many sites require battery backup. One of the most common faults I see is inadequate battery backup. Most specs call for 4 or 8hrs battery backup capacity. With a single 7Ah battery in a power supply that has a continuous load of 1.75Amps the expected battery backup time would be 7Ah ¸1.75A= 4 Hours *nominally*. In the real world batteries have a discharge curve which means that as they discharge the supply voltage decreases so an allowance of about 20% needs to be made, so our above example will *realistically* only supply 3 ¼ hrs. Even less if the batteries are old and have decayed.

Potential earth loops:

Please be wary of any power supply that earth references the negative of the supply to the earth pin of the 240V plug. This WILL cause problems in the real world in the form of earth loops. Most commonly these will occur on larger camera systems and on modular type access control systems.

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