

Technical Paper

Choosing a power supply for your medical application. Some things to consider.



Many of the decisions you need to make when selecting a medical power supply are similar to any other application. These being as follows:

- what power is required?
- where is the power supply to be located?
- are there space or size restraints?
- is noise a factor?
- How many outputs do you need?
- What format do you want?

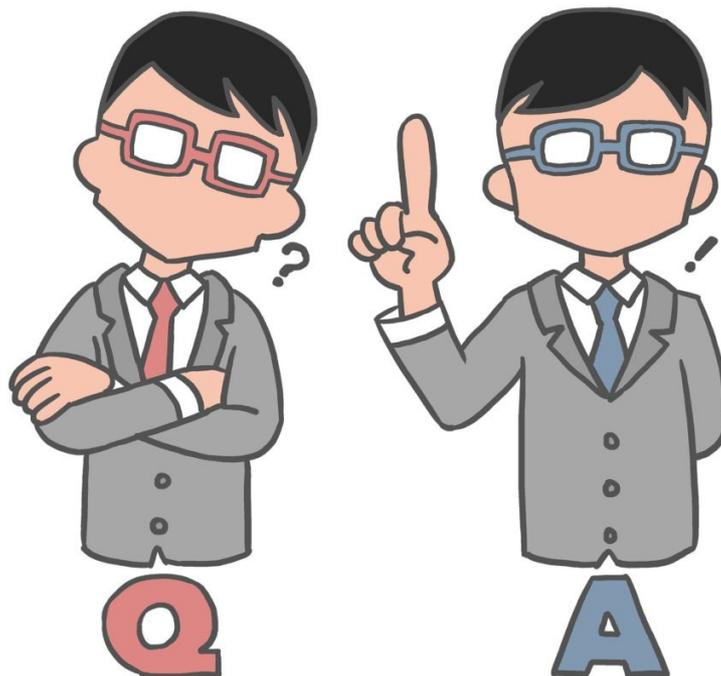
So, what makes a medical power supply different then?

Where medical power supplies differ is that they have very low leakage current to protect both users and patients. Selecting the right power supply for your application is a critical decision to ensure your end product is successful and will meet safety requirements.

To ensure that the unit selected meets the required levels of protection, they should be certified to the globally recognised standard, 60601-1, which defines the safety requirements for equipment that is connected to a power supply and used to diagnose, treat or monitor a patient in a medical application. be that in a medical, dental or lab environment.

The key element of the safety requirements is to ensure that the electrical current used, stays away from the patient and operator of the equipment. This is called AC leakage.

To prevent the leakage of AC current, the leakage current is controlled by increased creepage and clearance distances and increased insulation. Whereas an industrial supply would require a creepage and clearance distances of 2.5mm for basic insulation and 5mm for supplementary levels, for a medical unit these are increased to 4mm and 8mm respectively. The electrical strength test for this insulation is also increased to 4kVac from 3kVac.



Can our engineers assist you?

We are very happy to assist with product selection and can offer technical support throughout the design cycle.

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Many new terms were introduced in the 3rd edition of 60601-1 and we will cover what these are and how they affect your selection.

Class I or Class II – it's all about the earth.

What's the difference, between a Class I or Class II supply.

On a Class I unit the power supply provides a protective earth in case there is an insulation failure, by using a 3-pronged AC plug. Class II units rely upon the insulation in the power supply to provide the protection.

MOPPS & MOOPS – what does this mean?

MOOP is “means of operator protection”, MOPP is “means of patient protection” the latter is a higher level of protection and the highest level being 2 x MOPP.

Most medical units are 2 x MOPP and that is what we would suggest for most applications.

Type B, BF or CF – what's the difference and does it affect your application?

The 60601-1 standard refers to the term “applied part” which means a medical device that may come into physical contact with the patient during its normal operation.

These fall into three classes: B (body), BF (body floating), and CF (cardiac floating) and depend upon how the device is used and type of contact with the body.

Type B devices may be connected to earth ground, but Type BF and CF are separated from earth for added protection and are considered floating. Power supply isolation voltages vary according to the type rating and each has a different protection level against electrical shock.

Type B devices can be immediately released from the patient. Examples would be operating theatre lighting, medical lasers, MRI body scanners or hospital beds etc

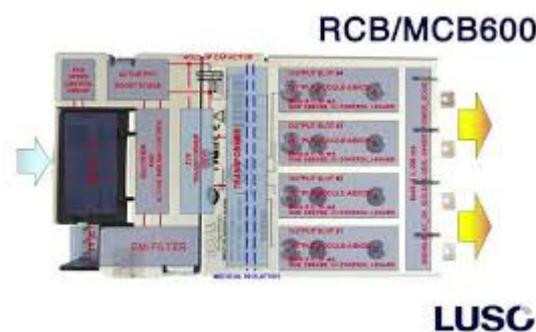
Type BF (body floating) is generally used for devices that have conductive contact with the patient, or have medium or long-term contact with the patient. Typical examples of such equipment would be monitoring equipment, ultrasound or incubators.

Type CF (cardiac floating) is subject to the most stringent classification, and is used for devices that may come into direct contact with the heart, such as dialysis machines.

The majority of power supplies available meet the BF requirements, if the application requires the CF type your choice is likely to be limited.

Internal or external supply?

This is an interesting choice; many applications do not need the power supply to be incorporated inside the unit, or don't have the space for it. Adaptors are now available with power ratings of up to 300W so can easily cover the requirements for many applications and with the adaptor already having safety certification this eases the burden of end equipment approvals. These can also be supplied with locking connectors to ensure the power supply isn't accidentally removed.



Multi output, configurable units, what are the benefits?

Many medical applications have multiple component parts with differing power requirements. Usually this can be dealt with by the use of a distributed system architecture with an AC/DC unit supplying a fixed DC bus voltage that is then converted by various dc/dc converters at the point of load. Alternatively, especially if higher power is required a modular configurable unit may be a sensible option.

These can be configured by the manufacturer or distributor at their configuration centre to supply a unit that meets the exact needs of the end equipment, supplying a variety of output voltages at the correct power levels for the application, ready to install into the end equipment and reducing the number of components used. They also reduce the possible need for multiple power supplies and therefore reduce space required.

Conclusion

You need to ensure that the power supply selected meets the latest version of 60601-1 and we would suggest that for most applications a unit that provides protection of 2 x MOPP is recommended. Our power specialists are on hand to assist with product selection to help find a solution meet your application.

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For more information or assistance please contact us:

sales@lusoelectronics.com