

## Power components and solutions for medical applications and equipment



consult. design. integrate.

[C] G50/0.80 kHz  
FA5/F1/8  
TDI

Amplitude

P-R segment  
S-T segment

## Power solutions and components to drive outstanding patient experiences and outcomes

### Critical equipment



The Medical device market is growing at an incredible rate to support healthcare professionals with the demands of increased patient expectations, care levels and limited resources. There are now a wide variety of applications where technology is becoming more sophisticated and integral, from critical equipment to laboratory and general communication devices. However, as digital transformation in medical technology continues to gain momentum, choosing the right component is increasingly challenging for these specialised applications.

### Laboratory research



We offer a specialist portfolio of market-leading standard and custom products and services which are ideal for the needs of medical applications and meet EN 60601-1's standards. We utilise our expert product knowledge and medical application experience to bring ideas from a concept to production, supporting every step of the journey.

### Diagnostics



Every medical device needs power, and there are a wide variety on the market to choose from, however the features each component includes ie arc limits, tight line and load regulation, voltage monitoring, can make a huge difference to the overall efficiency and reliability of the end device.

## Solutions for today's challenges and developing tomorrow's future

### Treatment & Delivery



Acal BFi are a trusted partner offering leading-edge technology solutions for application-specific designs, supporting hundreds of customers across Europe. Our engineers are subject-matter specialists who combine their technology expertise with medical sector experience to find the right product or solution for your project and application.

The most important thing for us is to help you find or create the right solution for your requirements. So, when you are ready, contact any of our offices across Europe, and we will be happy to help you with your next challenge.

## Discover our range of AC/DC and DC/DC converters

Our portfolio of medical-grade AC/DC and DC/DC converters includes some of the industry's most respected and innovative power supply manufacturers. Our standard range starts at 1W DC/DC converters, includes open-frame components and goes up to 100kW AC/DC for customised power-supply units. Our in-house design and customisation capabilities and network of expert partners enables us to help you find, customise or design an efficient power supply for your application.

### AC/DC and DC/DC from 1 – 24,000W

	PCB Mounted		Internal (O-F/ Enclosed)	External (Wall / Desk)	Modular	Rack-based
	(AC/DC)	(DC/DC)				
			500 – 1000W 2x MOPP		200 – 1800W 2x MOPP	
		6 – 20W	20 – 4920W 2x MOPP	10 – 40W	400 – 24,000W 2x MOPP	
	20W 2x MOPP		40 – 350W 2x MOPP	15 – 100W 2x MOPP		
			40 – 1000W 2x MOPP	55 – 65W 2x MOPP		
						520W 2x MOPP
		1 – 6W 2x MOPP				
			60 – 425W 2x MOPP	12 – 240W 2x MOPP		
		100 – 150W 2x MOPP	300 – 1400W 2x MOPP			
			30 – 400W 2x MOPP	20 – 200W 2x MOPP		
			30 – 650W 2x MOPP	20 – 400W 2x MOPP		

\* Skynet - Available in BeNeLux and Nordics

\*\* FSP - Available in UK, Germany, France and Italy

## PCB-mounted

### AC/DC

Our low-voltage AC/DC power bricks provide design engineers with efficient, flexible and isolated power conversion modules which can be mounted externally or internally on a PCB. Our specialist portfolio offers a market-leading range of PCB AC/DC converters on industry-standard footprints.

### DC/DC

Do you need a DC/DC converter with the flexibility and safety features needed to change and regulate the current in a medical device? Our portfolio of DC/DC converters are designed to meet the needs of medical applications such as powering sensors, isolated interfaces, auxiliary power supplies, A/V as well as IT equipment etc.



### PCB-mount AC/DC modules



#### Key features

- Power: 20W
- Output range: 5 – 24VDC
- 2xMOPP, Class II
- Peak load: 130%
- Low leakage current

### PCB-mount DC/DC Converters



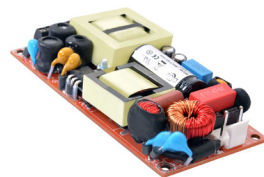
#### Key features

- Power range: 1 – 150W
- Output range: 3,3 – 24VDC
- Package: SIP7 to 1/4 Brick
- 2xMOPP, up to CF-rating (incl. defibrillator-proof)
- Low leakage current

## Open frame and enclosed power supplies

For medical applications with high-power requirements, our internal power supplies can easily be mounted within your device. Our portfolio offers a market-leading range of very power-dense supplies in any form factor. By partnering with us to choose from our range we can support you in designing a smaller, more compact and powerful end product.

### AC/DC Open- & U-frame



#### Key features

- Power range: 20 – 800W
- Output range: 5 – 58VDC
- 2xMOPP, Class II
- Ultra low profile (to 0.75")
- High power density
- Low leakage current

### AC/DC Enclosed



#### Key features

- Power range: 300 – 1400W
- Output range: 5 – 58VDC
- 2xMOPP, up to CF-rating (including defibrillator-proof)
- Low leakage current
- Variable fan speed



## External wall-plug and desk-top adaptors

When an integrated power supply design is not an option, cost-effective external adaptors are a great alternative. Our range of external supplies provide a choice of wall-plug and desktop adaptors with universal inputs, a range of output voltages and certifications for worldwide medical standards. We can also modify standard solutions to make your product stand out in the market place.

### AC/DC Wall-plug adaptors



#### Key features

- Power range: 10 – 32W
- Output range: 5 – 48VDC
- 2xMOPP, Class II
- 60601-1 4th Ed. EMC
- Interchangeable AC plugs
- up to 10 years e-cap life

### AC/DC Desk-top adaptors



#### Key features

- Power range: 10 – 240W
- Output range: 5 – 48VDC
- 2xMOPP, Class II
- 60601-1 4th Ed. EMC
- Altitude up to 5000m
- up to 10 years e-cap life

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**SL**  
POWER ELECTRONICS  
A STEEL PARTNERS COMPANY



## Modular

Our modular power supplies give you the flexibility to create your own, user-configurable power supply. The range includes market-leading fanless, modular power supplies which can be customised with several card modules to create the exact power supply you need. You can flexibly choose from dual output options, various voltages, currents and more. You can also, effectively change the character of the power supply from being a classic power supply, to become a constant current source or charger. We are uniquely positioned, with our in-house design engineers to pre-configure modules, providing you with a bespoke, plug-and-play solution.

### Modular power supplies



#### Key features

- Power range: 200 – 1800W (up to 1000W fan-less with natural convection)
- Output range: 1 – 58VDC
- Up to 12 isolated modular outputs
- PMBus™ for complete digital communications and control

**Advanced Energy**

**ARTESYN**  
Embedded Power | An Advanced Energy Company

## Rack-based

For racks with high-power requirements, our products can be stacked to provide a powerful option in one rack or on their own, for multiple devices and applications. Our portfolio offers a market-leading range of isolated rack-mounted transformers, isolating and protecting patients, while providing the power needed to give patients better outcomes and experiences.



### 19" Rack-based



#### Key features

- Power: 520W
- Outputs:
  - 230VAC
  - 5VDC
  - 12VDC
- All outputs isolated from input with 4kVAC
- Total of 18 regulated DC output connections (sharing a max. load of 10A)
- Customisable for your application

## Need help building a custom power supply?

Our Power team offer much more than just off-the-shelf products.

When designing electronic equipment, power supplies can often cause complex design challenges, particularly in the areas of heat dissipation, derating, space, durability and reliability. Acal BFi have dedicated competence centres in Europe providing inhouse design, configuration, pre-compliance testing facilities, with all the relevant certifications. We can offer a hugely flexible range of options for powering your design.

### Custom services



#### Key features

- Modular power supply configuration
- Product integration and assembly
- On-site EMC chamber for pre-compliance testing
- Repairs
- Custom power supply design

## Case study: - How Acal BFi's expertise in the medical market helped design a high-efficiency, uniquely sized, power transformer for medical trolleys

### Challenge

In the challenging and fast-paced environments medical professionals work in, equipment needs to be easy-to-access. This means new equipment must be flexible and customised to speed up treatment delivery.

Our primary customer is a manufacturer of medical trolleys for areas such as surgery rooms and intensive care. Their trolleys are modular to enable medical professionals to customise the equipment, by the application. However, finding a power supply for their trolleys was a challenge because standard certified products were the wrong size and a custom power supply needed to be medically certified.

In addition, with digital transformation driving an increasing amount of equipment in hospitals, power costs are growing and power-efficiency is becoming more important. Therefore, the manufacturer required a power supply which was extremely efficient. Their technical power supply requirements were:

- Over 96% efficiency
- Less than 4x In (I nominal) inrush current, rather than the standard 12-18x In
- A low leakage current (< 70uA) according to the medical norm
- Low profile and suitable to fit with the dimensions of the trolley
- Certified to EN60601

### Solution

Acal BFi started working with this manufacturer during their design process to help scope out their total power requirements and tailor the specification. Noratel, a leading supplier of high-quality transformers was chosen because of it's long history of creating customised, high-quality medical power supplies.

To support the manufacturer, Noratel produced a variety of prototypes throughout their design process. The power supply and enclosure were a specific size and low profile to reduce the amount of the trolley's capacity taken up by power. The power supply chosen, was a toroidal transformer which was designed to meet the manufacturer's exact requirements; including low losses, low inrush current to prevent dangerous EMI risks, over 96% efficiency and tested to meet the EN60601 standard.

### Benefit

Together, using Acal BFi and Noratel's expertise, we were able to help the manufacturer create a modular trolley which could be configured to a medical professional's exact application, making it easier to use and flexible for their application-specific requirements. As the power supply occupied less space, the trolley could accommodate more equipment.

Power consumption for each trolley was dramatically reduced, in turn lowering the hospital's total cost of ownership and provided ongoing operational costs savings.



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