

Complete power solution delivers AC-DC and high voltage DC power for mass spectrometry equipment

INDUSTRY

Medical Life Science

SOLUTION

Excelsys CoolIX® 600 Ultravolt US, V, XS Series

EQUIPMENT

Mass Spectrometer

CHALLENGE

One of the leading mass spectrometer companies faced the challenge of finding a compact, adjustable, and stable power solution with extreme accuracy, low electrical noise, and no vibrations. The customer needed this for the development of their next-generation of portable, high-sensitivity mass spectrometers.

There are multiple DC voltages required in mass spectrometers, ranging from very high voltages (e.g., up to 6 kV and sometimes higher), to lower DC voltages for system electronics (e.g., 5 V, 12 V, 24 V). Ripple voltage, accuracy, and temperature coefficient requirements are key parameters to ensure precise measurement. Equipment can vary in size from large systems, down to more portable equipment, meaning weight and size considerations are key for system developers.

High voltage requirements called for six isolated outputs:

1. A positive and negative voltage up to 2 kV driven by 24 V input
2. A positive voltage up to 600 V driven by 24 V input
3. A positive and negative voltage up to 200 V driven by 5 V input
4. A positive voltage up to 100 V driven by 5 V input

Low voltage requirements for the system needed an AC-DC power supply to provide:

1. Isolated 24 V as the input to high voltage DC-DCs
2. Isolated 5 V as the input to high voltage DC-DCs
3. Isolated 24 V for various system electronics
4. 12 V Auxiliary (Always ON) for system logic control

SOLUTION

As a leading provider of high and low voltage power supplies, Advanced Energy (AE) was the perfect partner to provide technical expertise and complete power conversion solutions. From the AC input to the tightly regulated DC outputs, AE met the challenges facing this mass spectrometer equipment manufacturer.

The UltraVolt miniature and small footprint product series are engineered to deliver a stable, yet wide range of DC voltages where space is critical. These products provide adjustable, very low ripple output DC voltages via an analog interface. They are designed to have exceptionally low temperature coefficients, which means their sensitivity to temperature change is kept to a minimum. The products are available in positive and negative polarities, and they can be pulsed.



CoolX600, UltraVolt US, V and XS Series

The below UltraVolt product series were selected to meet the system requirements:

UltraVolt					
Product Family	Voltage range	Available Polarity	Input voltage Range	Ripple	Temperature Coefficient
US series	0-500 V	Both	5 and 12	<100 ppm	50 ppm/°C
V series	0-3 kV	Both	5, 12, 15, and 24	<100 ppm	100 ppm/°C
XS series	0-100 V	Both	5	<500 ppm	50 ppm/°C

The HV outputs, electronic control circuits, and software system must be powered from an AC-DC power supply. The low noise Excelsys CoolX600 series was ideal for this type of application. This compact, high power density power supply can accommodate four CoolMods, delivering various isolated low voltage outputs. The fanless power supply has no source of acoustic noise or vibrations.

The CoolX600 provided system design engineers the flexibility needed to control all of their low voltage system requirements with its modular design and adjustable low voltages managed via software control. A configurable CX06S CoolPac with CmH, dual output module (5 V and 24 V), delivered stable input voltages for high voltage DC-DC converters, a CmC, 24 V output module, provided the power for the system electronics, and the isolated 12 V/24 W auxiliary supply delivered power to a system touch panel and system logic control.

CoolX600 AC-DC				
CoolMod	Nominal Voltage	Voltage Range	Power	Ripple
CmC	24 V	15 to 28 V	200 W	1%
CmH	5 V	3 to 6 V	36 W	1%
	24 V	3 to 30 V	90 W	1%

RESULT

The compact Excelsys CoolX600 fanless power supply provided an excellent power engine for the system, addressing the challenges of portability with no vibration while delivering regulated DC outputs to drive the various system blocks, including the UltraVolt high voltage DC-DC converters. The high precision, low ripple DC outputs of the UltraVolt US, V, and XS series ensured optimal functioning of the sensitive measuring equipment.

Our application engineering support, with their expertise in both high voltage DC and low voltage AC-DC, drastically reduced the system integration challenges of the customer, thereby reducing development time and accelerating their speed to market.

CONCLUSION

Advanced Energy's high voltage DC-DC and AC-DC power solutions met the complex system requirements of a leading mass spectrometer manufacturer. We helped to achieve optimum performance levels, provide a single source for most of the customer's DC power requirements, reduce development time, and accelerate their time to market. The customer valued our extensive applications expertise in dealing with the DC voltage requirements for this type of instrument, as well as the AC-DC system power required. This experience in all aspects of system power demands simplified both system integration and compliance for system designers.

This mass spectrometer case study is only one example of how Advanced Energy can help customers. Advanced Energy's AC-DC and high voltage DC-DC power supplies have been used in many applications like this, and our design engineers leverage their knowledge of the development of next-generation power solutions to address the emerging requirements for next-generation mass spectrometers.



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