



XMOD 111E HIGH ENERGY

Freudenberg Battery Power Systems (FBPS) is a premium total system solution manufacturer of packs, battery management systems and controls, racks, and telematics. FBPS is capable of handling any energy storage need, anywhere in the world, from our highly automated advanced production facility in Midland, Michigan.

The XPAND Module (XMOD) is an ultra-high-density lithium-ion battery building block for highly-integrated Energy Storage Systems based on XALT Energy's world-class lithium-ion cells. XMOD was developed for use in high-voltage, high-capacity multi-module arrays housed in large enclosures to achieve an overall reduction in system mass, volume, and cost. XMOD is designed for use in medium to heavy-duty commercial trucks, buses and specialty applications such as construction and mining equipment.

Saving System Cost, Weight and Space

- XMOD modules have the same core construction as the exceptionally durable XPAND battery packs, designed to be placed in your enclosure
- XMOD design is optimized for large systems where the integrator installs the modules in a suitable protective enclosure. Eliminating individual pack enclosures saves system weight and allows modules to be packaged very close to each other, resulting in higher energy storage capacity in the available space
- With module arrays encased in a protective enclosure, high voltage connections can be made directly to the XMOD terminals, thereby eliminating the need for costly HV connectors and cables

Upgradeable, Ultra-Long Life Cycle Roadmap

- XMOD module accommodates cells in XALT's 225mm family without the need for retooling, anticipating a wide variety of application voltage, power, and energy
- As cell technologies advance or modules become available for re-purposing, the XMOD can be replaced while all external interfaces remain the same

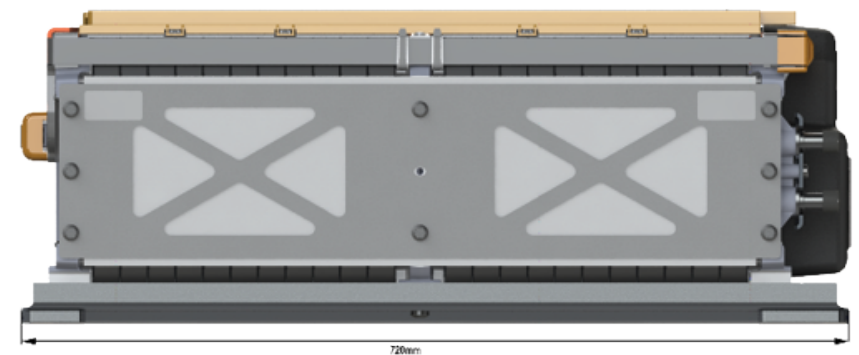
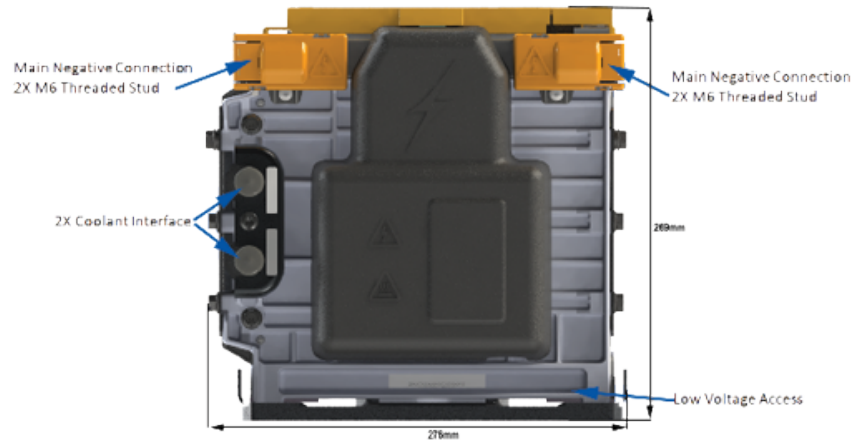
Advanced Thermal Management

- XMOD's advanced active liquid cooling system maintains ideal cell temperatures throughout the module, and responds quickly to increases in power demand and changes in ambient (environmental) temperatures
- Efficient direct liquid cooling prolongs cell life under the most demanding cycle profiles while maintaining reducing packaging volume



THE FBPS ADVANTAGE

- High specific energy and volumetric energy density
- Intended for ultra-high-density, long-range applications
- Outstanding safety and abuse tolerance
- Efficient direct liquid cooling maintains ideal cell temperatures
- Easy to install, configure, and upgrade
- ISO 9001:2015 certified production environment



FEATURES AND BENEFITS

Modular and Flexible Design

- Simplified high voltage, low voltage, and cooling interfaces to each application
- All connections at front panel; rear access not needed
- Designed for use in very large strings and pack combinations (up to 1250V per string and up to 24 strings in parallel)

System Support

- Battery Disconnect Unit (BDU)
- Master Control Unit (MCU)
- Low Voltage Harness (LVH) Kit
- FBPS Battery Viewer Telematics

Life Cycle Support

- XPAND Service Tool
- Remote Data Monitoring & Prognostics
- Module Replacement Maintaining Interface Connections
- End-of-Life Re-purposing, Recycling
- Integration Support
- On-site Training Classes

Certifications

- UN/DOT 38.3
- ISO, SAE

Additional Benefits

- In-house cell modeling and development creates sophisticated software and controls for accurate Power, SOC, and SOH predictions
- Custom warranty programs available



The information contained herein is believed to be reliable, but no representation, guarantees, or warranties of any kind are made to its accuracy or suitability for any purpose. The information presented herein is based on laboratory testing and does not necessarily indicate end product performance. Full scale testing and end product performance are the responsibility of the user.

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Performance	
Capacity (Rated @ C/10)	126Ah
Discharge Energy (Rated @ C/10)	11,100Wh
Nominal Voltage	88.3VDC
Specific Power*	≥416W/kg
Specific Energy	≥173Wh/kg
Energy Density	≥ 207Wh/l
Discharge Peak*	2.3C / 300A
Charge Peak*	1.1C / 150A
Discharge Continuous**	2.3C / 300A
Charge Continuous**	1C / 126A
Weight	64kg
Dimensions (all versions incl base) (L) 720mm (W) 276mm (H) 269mm	
*10 seconds duration	
**Cell performance will be affected by temperature, SoC, SoH, aging, etc.	

Cycle Life	Typical
100% DOD Cycles @ 0.3C charge-discharge	>3,000 cycles***
80% DOD Cycles @ 0.3C charge-discharge	>4,000 cycles***
***Cycle life to 80% of rated capacity at 23°C room temperature with 10 min. step rest	

Example of XMODs, BDU, and SCU System Within Protective Enclosure

