HELLi-lon

HIGH ENERGY LASER LITHIUM-ION BATTERY SYSTEM

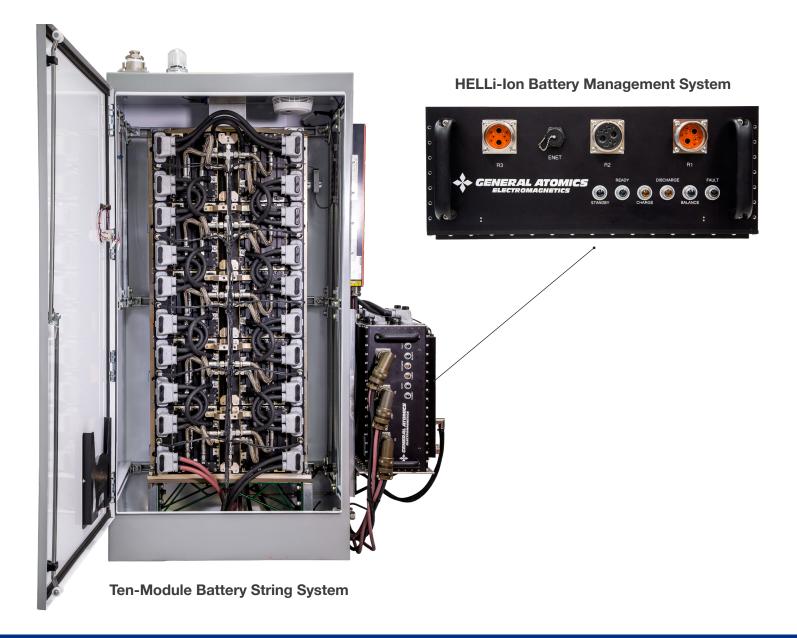


General Atomics Electromagnetic Systems (GA-EMS) is highly regarded for its high energy and power dense battery solutions that meet stringent Department of Defense requirements. Our HELLi-Ion[™] Battery System is a modular, compact energy storage system capable of supporting the power needs of tactical directed energy systems and High Energy Laser (HEL) applications.



HELLI-Ion BATTERY SYSTEM

- High energy and ultra high power in a significantly reduced footprint
- Scalable to suit airborne and vehicle-mounted platforms or facility installations
- Modular, fault-tolerant design prioritizes safety, performance and reliability
- Air, liquid or conduction-cooled interfaces available
- MIL-PRF-29595 performance tested and NAVSEA S9310 safety certified
- Battery Management System (BMS) with built-in charger available



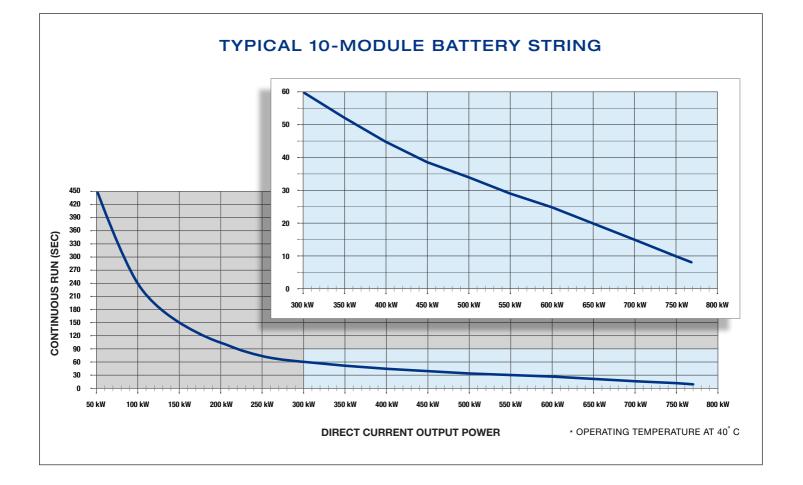
The HELLi-Ion Battery System utilizes specialized Lithium-Ion prismatic cell technology to enable extremely high power density in a small, compact package. The BMS monitors and controls battery operation to ensure optimal safety, performance and reliability.

The HELLi-Ion Battery System is scalable to meet specific energy storage requirements with systems ranging from a single battery module to multiple-rack configurations.

The specifications provided below are for a typical 10-module battery string. The HELLi-Ion Battery System can be tailored to meet platform and system requirements.



Gen-3 Battery Module (Liquid-Cooled)



SPECIFICATIONS

Output Voltage 300-492 VDC Output Current 2,000 Amps (maximum) Output Power 800 KW (maximum) Output Power 00 kW (maximum) Usable Energy Up 0 30 Mega-Joues 8.3 KW-hr Batteries Duty Cycle (batteries can be operated with any of these cooling 500 LWF Actor - Cooled by Natural Convection 5% Duty Factor - Cooled by Water >25% Duty Factor Dutput Dower See 600 kW - See (Output:) 15.000 ln* D2.51 h L x 20 in W x 55.25 in H Dutput Hower (programmable) Up to 57 kW Dutput Hower (programmable) <th colspan="2">SPECIFICATIONS FOR A TYPICAL 10-MODULE BATTERY SYSTEM</th>	SPECIFICATIONS FOR A TYPICAL 10-MODULE BATTERY SYSTEM	
Output Power 800 KW (rominal) 50 KW (maximum) Usable Energy Up to 30 Mega-Joules 8.3 kW-hr Batteries Duty Cycle (batteries can be operated with any of these cooling— - Cooled by Natural Convection 5% Duty Factor - Cooled by Natural Convection 10% Duty Factor - Cooled by Vater >25% Duty Factor - Cooled by Water >25% Duty Factor - Cooled by Water >25% Duty Factor - Cooled by Water >25% Duty Factor Energy Capacity: variable with output power Operating Temperature at 40°C (see graph on page 3) $25 \sec 900 kW$ 25 see 900 kW 25 see 900 kW 26 see 900 kW 25 see 15 so kW 26 see 900 kW 25 see 10 kW	Output Voltage	300-492 VDC
Output Power 750 kW (maximum) Usable Energy Up to 30 Mega-Joules 8.3 kW-hr Eatteries Duty Cycle (batteries can be operated with any of these cooling— - Cooled by Natural Convection 5% Duty Factor - Cooled by Natural Convection 10% Duty Factor - Cooled by Water >25% Duty Factor - Cooled by Water >25% Duty Factor - Cooled by Water >25% Duty Factor Energy Capacity: variable with output power >25% Duty Factor Operating Temperature at 40°C (see graph on page 3) 25 sec @ 150 kW 25 sec @ 700 kW 10 sec @ 700 kW 10 -Module Battery String Size/Weight (nominal) 25 sec @ 000 kW 25 sec @ 00 kW 15 sec @ 700 kW 10 -Module Battery String Size/Weight (nominal) 25 sec @ 000 kW 25 sec @ 00 kW 15 sec @ 700 kW 10 -Module Battery String Size/Weight (nominal) 25 sec @ 000 kW 26 arger Input Voltage 270 to 600 VDC (nominal) Charger Input Power (programmable) Up to 600 VDC (nominal) Charger Input Power (programmable) Size (volume): 5.400 in ² 22 in. L x 22 in. W x 11 in. H Sightery Management System Size/Weight (nominal) Size (volume): 5.400 in ² 22 in. L x 22	Output Current	2,000 Amps (maximum)
Batteries Dury Cycle (batteries can be operated with any of these cooling modes) - Cooled by Natural Convection 5% Duty Factor - Cooled by Vater >25% Duty Factor - Cooled by Water >25% Duty Factor Energy Capacity: variable with output power >25% Duty Factor Operating Temperature at 40°C (see graph on page 3) 147 sec @ 150 kW 25 sec @ 600 kW 25 sec @ 600 kW 10-Module Battery String Size/Weight (nominal) Size (volume): 15.600 in³ 10.25 in L x 26 in W x 55.25 in H Charger Input Otage 270 to 600 VDC (nominal) Charger Input Votage 270 to 600 VDC (nominal) Charger Input Votage 270 to 600 VDC (nominal) Charger Input Power (programmable) Up to 57 kW 95 – 98% efficient 98 - 98% efficient Charger Input Votage 270 to 600 VDC (nominal) Charger Input Rower (programmable) Up to 57 kW 95 – 98% efficient 98 - 98% efficient Statery Management System Size/Weight (nominal) Size (volume): 5400 in³ 22 in. L x 22 in. W x 11 in. H Weight: 30 bs Size (volume): 6400 in³ 22 in. L x 22 in. W x 11 in. H Weight: 30 bs Size (volume): 6400 in³ 22 in. L x 22 in. W x 11 in. H Size (volume): 100 but Voltage	Output Power	
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- Cooled by Forced Air Convection19% Duty Factor- Cooled by Water>25% Duty FactorEnergy Capacity: variable with output power Operating Temperature at 40°C (see graph on page 3)147 sec @ 150 kW 83 sec @ 000 kW 25 sec @ 600 kW 15 sec @ 700 kW10-Module Battery String Size/Weight (nominal)Size (volume): 15,600 in³ 10.25 in L x 26 in W x 55.25 in H Total weight: 739 ibsBATTERY CHARGERDutput PowerUp to 57 kW 95 - 98% efficientCharger Input Voltage270 to 600 VDC (nominal)Charger Input VoltageUp to 600 kW (maximum, per string)BATTERY MANAGEMENT SYSTEMUp to 600 kW (maximum, per string)Battery Management System Size/Weight (nominal)Size (volume): 5400 in³ 22 in. L x 22 in. W x 11 in. H Weight: 80 lbsHELLI-Ion BATTERY MODULE18 Ah @ C/5 @ 20° CNominal Capacity18 Ah @ C/5 @ 20° CNominal Output Voltage48 VDCNominal Output Voltage48 VDCSpecific Power (continuous)2000 ASpecific Power (pulse)>4 kW/kgSpecific Power (pulse)>4 kW/kgSpecific Power (pulse)>5 kW/kgAc Impedance @ 1 kHz<3.6 mQ @ 50% State of Charge @ 40° C	Batteries Duty Cycle (batteries can be operated with any of these cooling modes)	
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Energy Capacity: variable with output power Operating Temperature at 40°C (see graph on page 3)See @ 300 kW 25 see @ 600 kW 15 see @ 700 kW 15 see @ 700 kW 10 see @ 750 kW10-Module Battery String Size/Weight (nominal)Size (volume): 15,600 in³ 10.25 in L x 26 in W x 55.25 in H total weight: 739 lbsBATTERY CHARCEROutput PowerOutput PowerUp to 57 kW 95 - 98% efficientCharger Input Voltage270 to 600 VDC (nominal)Charger Input Power (programmable)Up to 60 kW (maximum, per string)BATTERY MANAGEMENT SYSTEMBattery Management System Size/Weight (nominal)Size (volume): 5400 in³ 22 in. L x 22 in. W x 11 in. H Weight: 80 lbsFLELLION BATTERY MODULE18 Ah @ C/5 @ 20° CNominal Capacity18 Ah @ C/5 @ 20° CNominal Output Voltage44 VDCMaximum Discharge Current (continuous)200 ASpecific Power (continuous)200 ASpecific Power (pulse)> KW/kgSpecific Power (pulse)> KW/kg	- Cooled by Water	>25% Duty Factor
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Contact GA-EMS to find out more about configuration options.

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