

VEHICLE ELECTRIFICATION SOLUTIONS



**MORE INNOVATIVE
MORE RUGGED
MORE ELECTRIC**



CRANE A&E VEHICLE ELECTRIFICATION SOLUTIONS



- Innovative power and cooling products for military and industrial vehicle electrification
- Rugged military and industrial solutions for the toughest missions
- Flexible designs meeting high density power, voltage and packaging needs
- Ongoing investment in electrification power technologies

OUR HISTORY

Crane Aerospace & Electronics is a leader of innovative and reliable electrical power, fluid management and sensing solutions equipped to persevere in the most rugged environments. On the battlefield, in space or in flight, our product solutions excel.

Military and heavy industrial vehicles are electrifying their fleets, and as platforms transition into hybrid or fully electric systems, we are ready now to provide innovative solutions thanks to our rich legacy expertise and strategic technology investment.

ELECTRICAL POWER CAPABILITIES

Crane A&E offers versatile electrical power solutions. From milliwatts to megawatts, we deliver efficient packaging, environmental durability and superior size, weight, power and cost for mission-critical systems.

Key Capabilities

- High Power Conversion (*available or in development)
 - Bi/Uni-Directional solutions (4kW-250kW)
 - (400VDC - 800VDC) input/28VDC output (15kW-30kW)
 - 600VDC - 900VDC-270VDC or 28VDC (4kW)
 - 600VDC input - Variable output (60 - 250 kW)
 - 600VDC input - 120/208VAC output
 - 120/208VAC 3 phase input - various DC output
- High efficiency and density
- Digital interfaces and control
- Communication interfaces: J1939/CAN, RS 485 ethernet
- EMI/EMC MIL-STD-461 verified
- Rugged MIL design shock/vibration to MIL-STD-810
- Customizable performance and packaging to meet customer needs

FLUID MANAGEMENT CAPABILITIES

Crane A&E delivers custom fluid solutions for a wide range of thermal management and fluid needs from conventional to next-generation applications. This includes environmental control systems, power generators, hydraulic, fuel, and all-electric/hybrid-electric power architectures. Since 1904, our Lear Rometec heritage brand has provided reliable fluid products to the aerospace & defense industry. Today, our Fluid Management group supplies fuel, water and coolant pumps, flow measurement and thermal management for complex fluid systems in the harshest applications.

Key Capabilities

- Pumps featuring up to 250 psi and 200 GPM per pumping element
- Explosion-proof electric motors
- Coolant pumps complete with integral motor controller, reservoir and valves
- Dry run capability

THE POWERHOUSE
AT FORT WALTON BEACH
HIGH POWER. HIGH CAPABILITY

Onsite 1.5MW High-Power Lab
Fort Walton Beach, FL



[MILITARY SOLUTIONS]

Engineered to operate in harsh battlefield conditions, Crane A&E delivers unmatched, custom and reliable mission-critical electric power system solutions for the coming generation of military hybrid and all-electric tactical and combat vehicles.

- High Power Bi-Directional Power Conversion
 - MIL-STD-3072 600VDC
 - 4kW-250kW (Isolated/Non-Isolated) solutions
 - J1939/CAN Bus
 - Designed to rugged MIL environment IP67
 - EMI/EMC
- Thermal management system solutions



[HEAVY INDUSTRIAL SOLUTIONS]

Built to power the toughest jobs, Crane A&E's suite of custom and off-the-shelf electric power system products offer solutions for next-generation hybrid and all-electric heavy industrial vehicles.

- Innovative power and cooling products for heavy industrial vehicle electrification

- Rugged commercial solutions equipped to tackle the toughest jobs
- Flexible designs meeting high density power, voltage and packaging needs
- Advanced development, continuous investment in electrification power technologies

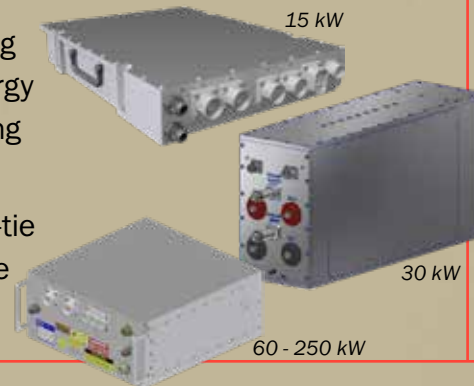


[PRODUCT SPOTLIGHT]

BI-DIRECTIONAL POWER CONVERSION

Our new 15 kW, 30 kW, and 120 kW bi-directional converters are engineered for use in hybrid and all-electric vehicle powertrains and are essential for in-vehicle power distribution.

- Permits charging and use of energy storage including Li-Ion batteries
- Supports cross-tie between vehicle power busses



MOTOR CONTROL

Our custom high-performance, scalable motor control solution is engineered to optimize motor-driven pump performance.

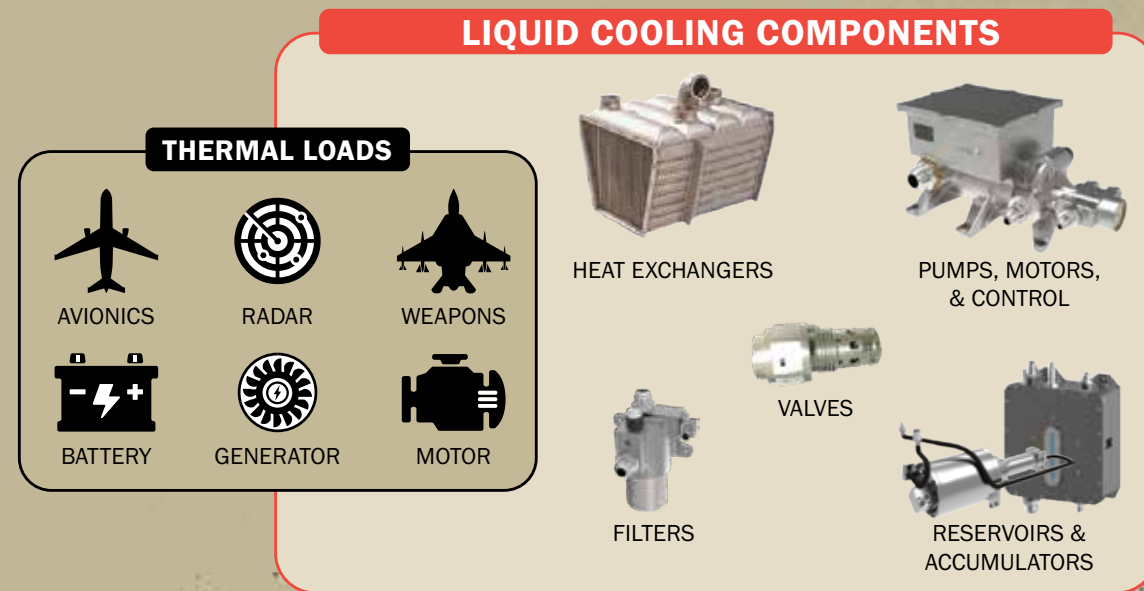
- Wide range of input voltages (28 Vdc - 540 Vdc)
- Power levels up to 5,000 W
- Optional health monitoring



THERMAL MANAGEMENT SYSTEMS

We've leveraged our rich history in fluid management to deliver innovative cooling products to satisfy elevated levels and new sources of thermal loads introduced by electric vehicle power systems.

- Broad offering of liquid cooling pump, motor and controller technologies
- Additional component offerings: reservoirs, accumulators, heat exchangers, valves and filtration
- High heat removal for harsh electronic environments



[PRODUCT SOLUTION MATRIX]

ELECTRICAL POWER

Bi-Directional Power*

600 Vdc - 28 Vdc, 15 kW

600 Vdc to Variable (60 - 250 kW)

30 - 100 kW Import/Export (600 Vdc - 115/208 Vac)

Up to 500 kW Motor Drive Inverter (600 Vdc input)

DC-AC Bi-Directional for Export Power and Vehicle to Grid

High Voltage DC-DC Converter (4 kW)

900 Vdc - 28 Vdc

270 Vdc - 28 Vdc

900 Vdc - 270 Vdc

High Power Conversion

High & Low Voltage Power Supplies

Integrated Starter Generator Controller (ISGC)

Integrated Power Assemblies w/ Self Contained Cooling

Motor Control

Battery Charging System (Custom)

Power Supply

* Available or in development

FLUID MANAGEMENT

Fuel, Water, Cooling and Lubrication Pumps

Thermal Management Systems

Tanks / Reservoirs

Accumulators

Filter Assemblies

Heat Exchangers

Valves

SENSING

Proximity Sensing Components

Pressure Sensors

Wireless Sensing - Tire Pressure Sensing

Fuel Gauging Components / Systems



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