

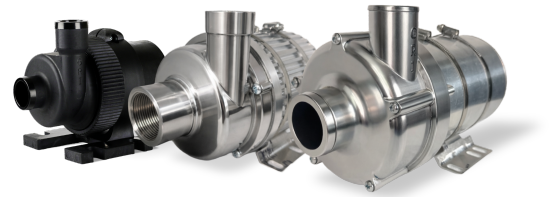
## BATTERY ELECTRIC VEHICLES (BEV)

Battery Electric Vehicles rely heavily on maintaining battery temperatures within a controlled and consistent range to ensure optimal performance, efficiency, and safety. Battery Thermal Management Systems (BTMS) are designed to regulate this temperature using active cooling methods, which include forced air or liquid cooling. In liquid-cooled systems, thermal management is achieved in two primary ways:

- Direct cooling (submersion): Fluid is in direct contact with battery cells
- Indirect cooling (closed-loop systems): Fluid circulates through cooling plates or piping loops

### PURPOSE OF PUMPS

- Circulate coolant through closed-loop thermal systems
- Maintain consistent temperature distribution across battery packs
- Support system efficiency and longevity



### MARKET ADVANTAGES

#### Motors & Electrical

- Brushless DC (BLDC) motors
- Voltage options: 12–24V, 36V, 48V
- Motors manufactured in-house by GRI
- Engineered for OEM-specific flow and pressure requirements

#### Smart Technology

- Proprietary control algorithm with real-time feedback
- Integrated protection and alerts:
  - Dry run detection
  - Over/under voltage protection
  - Over-temperature monitoring

#### Control Options

- 0–5V Analog
- PWM Digital
- CAN-Bus (J1939)
- Microprocessor-driven controls

#### Compliance & Approvals

- SAE J1455
- UL 778 (Motor-operated water pumps)

#### Magnetic Drive Technology

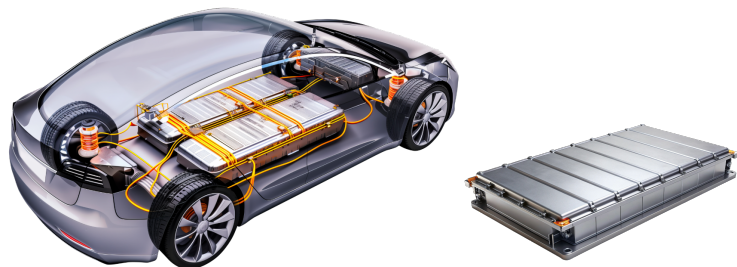
- Seal-less, leak-free design
- No mechanical seals to wear out
- Reduced maintenance requirements
- Motor isolated from fluid path for increased reliability

#### Thermal Performance

- Up to 221°F (105°C) – electronics separated from pump
- Up to 149°F (65°C) – electronics integrated within pump

#### OEM Configuration Options

- Multiple customization options available
- Designed for seamless integration into EV platforms and charging systems



Pump Series	Maximum Flow GPM, (LPM)	Maximum Head (FT, (PSI))	Maximum System Pressure	Motor Specs/Voltages
INTG3	8.85, (33.5)	37.0, (16.0)	75 PSI	12-24 VDC
INTG7	22.0, (83.0)	80.0, (35.0)	75 PSI	12-24, 36, 48 VDC
INTG8	39.0, (145.0)	70.0, (30.0)	75 PSI	12-24, 36, 48 VDC