

aerospace
climate control
electromechanical
filtration
fluid & gas handling
hydraulics
pneumatics
process control
sealing & shielding



Electric and Hybrid Electric Drivetrain Solutions



ENGINEERING YOUR SUCCESS.

Building Blocks of Parker Drivetrain Systems

Breakthrough Performance

Traction Motor / Generator

Parker's PMAC traction motor/generator design incorporates permanent magnets, segmented laminations, innovative heat transfer optimization, advanced automated winding processes and patent-pending cooling technology. These synergistically produce advanced output power.

- **Peak power density – 4.17 kW/kg**
- **Continuous power density – 2.3 kW/kg**

Traction / Range Extender Inverters

High performance IGBT based electronics provide the most control and versatility of any motor controller available.

- **Supports PMAC and AC induction motors**
- **Bi-directional, AC to DC, and DC to DC configurations available**
- **Fully programmable drivetrain control**
- **Full regen capabilities**

PMAC Motor Data

Specifications*	Air Cooling	External Liquid Cooling	Internal Liquid Cooling
Motor Dimensions			
Length (mm)	170 – 584	178 – 584	197.5 – 609
Cross-Section (mm)		143/185/267	
Shaft Diameter (mm)		28/38/48	
Mass (kg)		22 – 168	
System Performance			
Peak Power Output (kW)	16 – 180	21 – 230	35 – 350
Rated Power Output (kW)	up to 55	up to 155	up to 285
Peak Torque Output (Nm)	85 – 750	85 – 750	85 – 750
Stall Torque Output (Nm)	19 – 306	16 – 400	20 – 640
Peak Efficiency (%)	95	95	95
Max Speed (rpm x1000)	5/3.5/2	12/12/7.5	12/12/7.5
Rated Speed (rpm x1000)	3.2	4.5	6
Input Voltage (VDC)	24 – 750	24 – 750	24 – 750
Max Current (A _{RMS})	250	750	1250
Motor Thermal Limit			
Temperature (°C)	155	155	155
Cooling			
Flow Rate	5 m/s	8 L/min	8 L/min

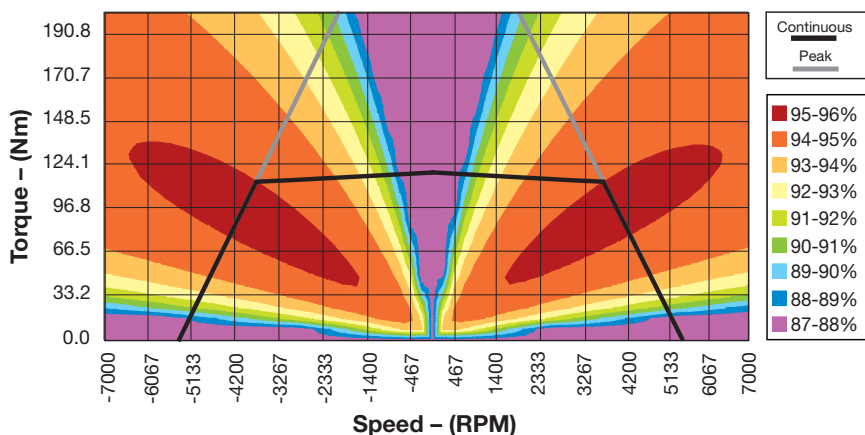
*Specifications illustrate performance range of traction motors/generators.

Highest Efficiency – 95%

Only when using the best component technology and optimal design characteristics do traction motors/generators and controllers minimize losses both during motoring and power generation – increasing vehicle range.

- **Automated winding assembly produces very dense, high copper fill**
- **Low pole-count rotor design minimizes rotational losses during motoring and while regenerating**
- **Ultra-thin stator laminations with reduced slots virtually eliminates eddy currents**
- **Very efficient IGBT power platform**

Efficiency Map - 2704



- **Air cooling, liquid cooling (water/glycol or hydraulic fluid), or an advanced 2-phase refrigerant cooling systems are available.**

Traction Inverters and Motors

Power to Solve...

(without emissions)



Traction Inverters

- AC induction or 3-phase PMAC
- Feedback: sensorless, encoder, resolver
- Analog/digital/relay inputs and outputs
- Traction/generator compatibility
- Regenerative braking
- CAN communications
- Liquid cooled
- Very low EMI

Traction Motor

- 3-phase PMAC
- Sensorless, encoder, resolver
- Removable phase leads
- Dual internal/external Liquid cooling
- Traction motor/generator
- High efficiency
- Internal/external spline

ALL ELECTRIC
SERIES HYBRID
PARALLEL HYBRID

Range Extender Inverter Drives and Generators

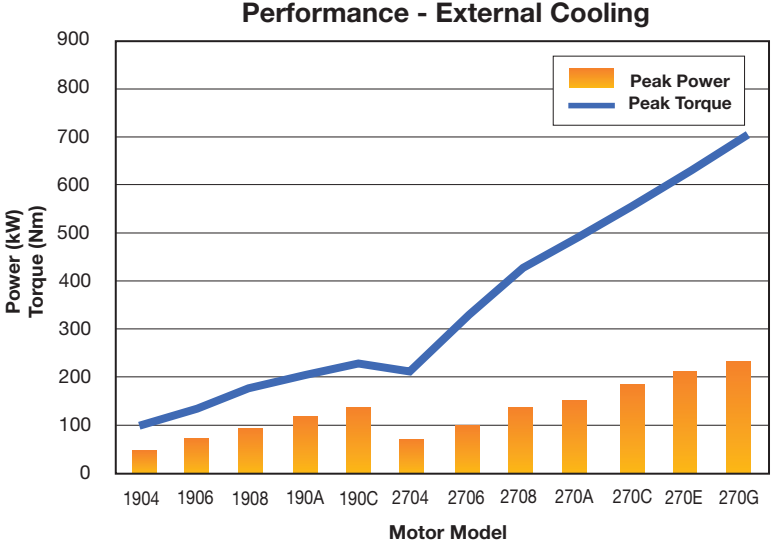
Broadest Scalability — largest power range

Traction Motor / Generator

- Three mechanical motor/generator frame sizes
- The extrusion-based housing, internal design and assembly methods give unmatched flexibility to scale the output power quickly.
- Peak output power from 25 kW to 250 kW in 12 lengths.
- Voltage from 24 to 750 VDC
- Current up to 1000 A+

Traction / Range Extender Inverters

- Five pre-engineered frame sizes cover a range power range of 5 kW to 300 kW, up to 1000 amps peak
- 24 VDC – 1000 VDC



Proven Quality and Manufacturability

Parker produces motors and drives for some of the most recognizable manufacturers of vehicles. It is through manufacturable designs with facilities capable of large quantity production and rigorous quality control, that Parker ensures success.

- Field-proven quality yielding 55,000+ hours of operation
- State-of-the-art manufacturing facilities offering cost-effective, US-based production of all traction motors and inverters
- Fully automated PCB assembly and test
- ISO 9001:2000



Building blocks: motor and drive combination for 175kW system

Vehicle Hardened Battery Rack with Local BMS Modules

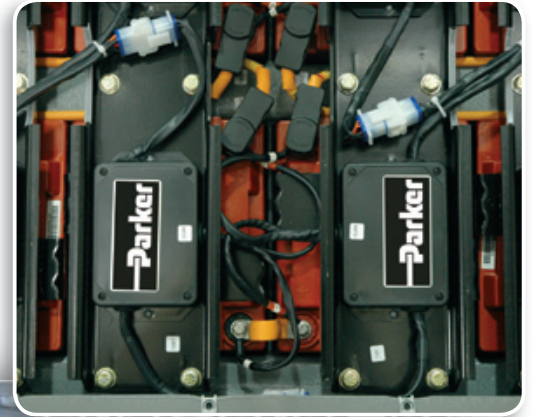
Hybrid electric platforms require a substantial amount of energy storage.

Parker provides pre-engineered mobile hardened battery racks, using a variety of standard cell types from traditional lead-acid to advanced Lithium Ion.

Battery management systems (BMS), which ensure safety and battery longevity, are integrated into these energy storage units.

BMS Monitors / Manages:

- Loading
- Temperature
- System Health
- Charging and cell-to-cell balancing
- Real-time communications for battery status to the supervisory system





Traction Motor/Generator Products:

Parker Hannifin Corporation
Electromechanical Automation, NA
5500 Business Park Drive
Rohnert Park, CA 94928
phone 800-358-9070
www.parkermotion.com/drivetrain

Inverter Drives/Generator Products:

Parker Hannifin Corporation
SSD Drives Division, NA
9225 Forsyth Park Dr.
Charlotte, NC 28273
phone 704-588-3246
www.parkermotion.com/drivetrain