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Electric and Hybrid Electric Drivetrain Solutions





ENGINEERING YOUR SUCCESS.

Traction Inverters and Motors

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

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 lamintions with reduced slots virtually eliminates eddy currents
- Very efficient IGBT power
 platform

o	Air	External Liquid	Internal Liquid
Specifications*	Cooling	Cooling	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

PMAC Motor Data

*Specifications illustrate performance range of traction motors/generators.



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

Efficiency Map - 2704

Building Blocks of Parker Drivetrain Systems



(without emissions)

Parke

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 sizes.
- Voltage from 24 to 750 VDC
- Current up to 1000 A+

Traction / Range Extender Inverters

- Five pre-engineered frame sizes cover a 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 recognized 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





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Traction Motor/Generator Products:

Parker Hannifin Corporation **Electromechanical Automation, NA** 5500 Business Park Drive Rohnert Park, CA 94928 phone 800-358-9070 http://hev.parker.com Inverter Drives/Generator Products:

07.20.10

Parker Hannifin Corporation **SSD Drives Division, NA** 9225 Forsyth Park Dr. Charlotte, NC 28273 phone 704-588-3246 http://hev.parker.com