Drives for Hybrid and Electric Vehicles
24 to 800 VDC

Parker

ENGINEERING YOUR SUCCESS.
WARNING — USER RESPONSIBILITY

FAILURE OR IMPROPER SELECTION OR IMPROPER USE OF THE PRODUCTS DESCRIBED HEREIN OR RELATED ITEMS CAN CAUSE DEATH, PERSONAL INJURY AND PROPERTY DAMAGE.

- This document and other information from Parker-Hannifin Corporation, its subsidiaries and authorized distributors provide product or system options for further investigation by users having technical expertise.
- The user, through its own analysis and testing, is solely responsible for making the final selection of the system and components and assuring that all performance, endurance, maintenance, safety and warning requirements of the application are met. The user must analyze all aspects of the application, follow applicable industry standards, and follow the information concerning the product in the current product catalog and in any other materials provided from Parker or its subsidiaries or authorized distributors.
- To the extent that Parker or its subsidiaries or authorized distributors provide component or system options based upon data or specifications provided by the user, the user is responsible for determining that such data and specifications are suitable and sufficient for all applications and reasonably foreseeable uses of the components or systems.
Drives for Hybrid and Electric Vehicles

Low Voltage Mobile Drives - MC Drives

Overview ................................................................. 5
Product Details ......................................................... 6
Technical Data .......................................................... 7
Dimensions .............................................................. 8
Order Code .............................................................. 9

Full Voltage Range Mobile Drives - MD Drives

Overview ................................................................. 11
Technical Data .......................................................... 12
Dimensions .............................................................. 13
Product Details .......................................................... 15
Order Code .............................................................. 16

Related Products

Global Vehicle Motor (GVM) .......................................... 17
Electro-Hydraulic Pumps (EHP) ...................................... 17
CFR - Low voltage induction motors ............................. 17
Parker Hannifin
The global leader in motion and control technologies

A world class player on a local stage

Global Product Design
Parker Hannifin has more than 40 years experience in the design and manufacturing of drives, controls, motors and mechanical products. With dedicated global product development teams, Parker draws on industry-leading technological leadership and experience from engineering teams in Europe, North America and Asia.

Local Application Expertise
Parker has local engineering resources committed to adapting and applying our current products and technologies to best fit our customers’ needs.

Manufacturing to Meet Our Customers’ Needs
Parker is committed to meeting the increasing service demands that our customers require to succeed in the global industrial market. Parker’s manufacturing teams seek continuous improvement through the implementation of lean manufacturing methods throughout the process. We measure ourselves on meeting our customers’ expectations of quality and delivery, not just our own. In order to meet these expectations, Parker operates and continues to invest in our manufacturing facilities in Europe, North America and Asia.

Electromechanical Worldwide Manufacturing Locations
Europe
Littlehampton, United Kingdom
Dijon, France
Offenburg, Germany
Filderstadt, Germany
Milan, Italy

Asia
Wuxi, China
Jangan, Korea
Chennai, India

North America
Rohnert Park, California
Irwin, Pennsylvania
Charlotte, North Carolina
New Ulm, Minnesota

Local Manufacturing and Support in Europe
Parker provides sales assistance and local technical support through a network of dedicated sales teams and authorized technical distributors throughout Europe.

For contact information, please refer to the Sales Offices on the back cover of this document or visit www.parker.com
Low Voltage Mobile Drives - MC Drives

Overview

Description
Parker MC series represents the latest design standards for compact and reliable controllers for mobile applications.

Providing a motor control solution for battery systems between 24 and 96 VDC, the MC motor controllers provide OEMs with a superb combination of power, performance and functionality.

The compact dimensions and high efficiency of this controller make integration into very tight spaces a reality without sacrificing output performance.

It's design has been optimized to produce the lowest possible installed cost, whilst still maintaining superior reliability even in the most demanding of applications.

Product Features

- Auto-tuning
- Possible customization (firmware)
- High efficiency cold plate heat sink design
- IP65 protection class
- Motor temperature sensor input
- Encoder supply output (5 V)
- Encoder input, A/B (ACIM) and Sin/Cos (PMAC)
- Dual, configurable throttle inputs
- Configurable CAN communication
- Parker IQAN compatible
- Ability to control vehicle control tasks separately from motor control
- 5 configurable coil drive outputs
- 2 configurable digital outputs
- 2 Analogue inputs / 6 Digital inputs
- Powerful MC configuration utility for system design and diagnostics
- Safety Interlock relay for battery connection

Applications

- Utility vehicles
- handling equipment, handling gantries
- Refuse Truck
- Bus and Coach
- City van
- Turf care
- Street sweepers
- Other hydraulic pump control

Technical characteristics - overview

<table>
<thead>
<tr>
<th>Model</th>
<th>MC</th>
</tr>
</thead>
<tbody>
<tr>
<td>Motor type</td>
<td>AC induction + PMAC</td>
</tr>
<tr>
<td>Nominal voltage</td>
<td>24/96 VDC</td>
</tr>
<tr>
<td>Max 2 min current</td>
<td>800 Arms</td>
</tr>
<tr>
<td>Max 2 min power</td>
<td>60.6 kVA</td>
</tr>
<tr>
<td>Switching freq.</td>
<td>10 kHz</td>
</tr>
<tr>
<td>Operating temperature</td>
<td>-40 °C to 50 °C</td>
</tr>
<tr>
<td>Storage temperature</td>
<td>-40 °C to 95 °C</td>
</tr>
<tr>
<td>Protection</td>
<td>IP65</td>
</tr>
<tr>
<td>Control type</td>
<td>Speed or Torque control</td>
</tr>
<tr>
<td>Feedback</td>
<td>Quadrature encoder (ACIM) Sin/Cos (PMAC)</td>
</tr>
<tr>
<td>Communications</td>
<td>CANopen, RS232/485 serial</td>
</tr>
<tr>
<td>Cooling</td>
<td>Air-cooled</td>
</tr>
<tr>
<td>Certifications</td>
<td>EMC: designed to EN12895, Safety: designed to EN1175, CE marked to EN 61800-5-1 (Safety, Low Voltage Directive)</td>
</tr>
<tr>
<td>Output Frequency</td>
<td>300 Hz (AC induction) 400 Hz (PMAC)</td>
</tr>
</tbody>
</table>
Low Voltage Mobile Drives - MC Drives
Product details

**Product Details**

Thanks to an IP65 protection class, the drive can be direct vehicle mounted without an enclosure.
(no direct high pressure spray)

- **Battery connections**
- **U-V-W Motor connections**
- **High efficiency cold plate heat sink design**
  - Heat sink is sized to support 2 min. of peak current
- **Gore vent area to avoid condensing**
  - Higher reliability in harsh conditions.
- **Single automotive rated Tyco connector for drive connections**

**Software**

**MC Configuration Manager Software** (free download on parker.com)

- The unique Auto-Tune function allows quick and easy characterization of the motor
- System monitoring
- System diagnostics
- Adjust system variables and programmable parameters
- Online or offline use

Software and connecting devices are required as shown here.

**MC Configuration Manager**

![Diagram of MC Configuration Manager and MC drive with connections](image)

<table>
<thead>
<tr>
<th>Order Code</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>USB-MC-00</td>
<td>PC interface cable</td>
</tr>
<tr>
<td>MCINVERTER-LINK-CABLE</td>
<td>MC drive interface cable</td>
</tr>
</tbody>
</table>
## Technical Data

<table>
<thead>
<tr>
<th>Part number</th>
<th>Switching frequency</th>
<th>Max Output frequency</th>
<th>Rms output 1 hour Current A rms</th>
<th>Rms output 2 min current A rms</th>
<th>Nominal Input Voltage VDC</th>
<th>Weight [kg]</th>
</tr>
</thead>
<tbody>
<tr>
<td>MCC-02-0180-01-00</td>
<td>10kHz</td>
<td></td>
<td>90</td>
<td>180</td>
<td>24</td>
<td>1.7</td>
</tr>
<tr>
<td>MCC-02-0250-01-00</td>
<td></td>
<td></td>
<td>125</td>
<td>250</td>
<td>24</td>
<td></td>
</tr>
<tr>
<td>MCC-02-0375-01-00</td>
<td></td>
<td></td>
<td>185</td>
<td>375</td>
<td>24</td>
<td></td>
</tr>
<tr>
<td>MCC-04-0200-01-00</td>
<td></td>
<td></td>
<td>100</td>
<td>200</td>
<td>36-48</td>
<td></td>
</tr>
<tr>
<td>MCC-04-0350-01-00</td>
<td></td>
<td></td>
<td>175</td>
<td>350</td>
<td>36-48</td>
<td></td>
</tr>
<tr>
<td>MCC-08-0175-01-00</td>
<td></td>
<td></td>
<td>80</td>
<td>175</td>
<td>48-80</td>
<td></td>
</tr>
<tr>
<td>MCC-08-0250-01-00</td>
<td></td>
<td></td>
<td>144</td>
<td>250</td>
<td>48-80</td>
<td></td>
</tr>
<tr>
<td>MCD-03-0500-01-00</td>
<td>400Hz (PMAC)</td>
<td>10kHz</td>
<td>235</td>
<td>500</td>
<td>24-36</td>
<td>2.8</td>
</tr>
<tr>
<td>MCD-04-0450-01-00</td>
<td></td>
<td></td>
<td>215</td>
<td>450</td>
<td>36-48</td>
<td></td>
</tr>
<tr>
<td>MCD-08-0350-01-00</td>
<td></td>
<td></td>
<td>149</td>
<td>350</td>
<td>48-80</td>
<td></td>
</tr>
<tr>
<td>MCE-03-0650-01-00</td>
<td></td>
<td></td>
<td>285</td>
<td>650</td>
<td>24-36</td>
<td>4.1</td>
</tr>
<tr>
<td>MCE-04-0550-01-00</td>
<td></td>
<td></td>
<td>250</td>
<td>550</td>
<td>36-48</td>
<td></td>
</tr>
<tr>
<td>MCE-04-0600-01-00</td>
<td></td>
<td></td>
<td>260</td>
<td>600</td>
<td>36-48</td>
<td></td>
</tr>
<tr>
<td>MCE-08-0450-01-00</td>
<td></td>
<td></td>
<td>185</td>
<td>450</td>
<td>48-80</td>
<td></td>
</tr>
<tr>
<td>MCF-03-0800-01-00</td>
<td></td>
<td></td>
<td>365</td>
<td>800</td>
<td>24-36</td>
<td>6.8</td>
</tr>
<tr>
<td>MCF-04-0650-01-00</td>
<td></td>
<td></td>
<td>325</td>
<td>650</td>
<td>36-48</td>
<td></td>
</tr>
<tr>
<td>MCF-08-0550-01-00</td>
<td></td>
<td></td>
<td>190</td>
<td>550</td>
<td>48-80</td>
<td></td>
</tr>
<tr>
<td>MCF-08-0650-01-00</td>
<td></td>
<td></td>
<td>195</td>
<td>650</td>
<td>48-80</td>
<td></td>
</tr>
<tr>
<td>MCF-09-0550-01-00</td>
<td></td>
<td></td>
<td>200</td>
<td>550</td>
<td>72-96</td>
<td></td>
</tr>
<tr>
<td>MCF-09-0650-01-00</td>
<td></td>
<td></td>
<td>200</td>
<td>650</td>
<td>72-96</td>
<td></td>
</tr>
</tbody>
</table>

Notes: All current ratings are rms values per motor phase. Continuous current for design life is the maximum long-term current, at an internal heatsink long-term temperature of 70 °C, at which the controller will achieve its design life (20,000 h for 24 ... 96 VDC). Note that much higher 1 h ratings can be achieved with additional heatsinking.
Low Voltage Mobile Drives - MC Drives

Dimensions

MC C

- Dimensions [mm]
- 3x MEX1.0 - 4Hg20
- 4x ø7
- 140 x 159
- 180 x 169
- 69.5 x 80.5
- 5.5 x 68.5
- Status LEDs 7 dia., 4 plcs
- M8 ø 1.25, 6 plcs
- B - B +
- MC E

MC D

- Dimensions [mm]
- M8 ø 1.25, 6 plcs
- Status LEDs 7 dia., 4 plcs
- MC F

MC E

- Status LEDs 7 dia., 4 plcs
- 140 x 159
- 180 x 169
- 69.5 x 80.5
- 5.5 x 68.5

MC F

- Status LEDs 7 dia., 4 plcs
- 275 x 232
- 255 x 232
- 102 x 80
- 13 x 19
## Order Code

<table>
<thead>
<tr>
<th>Order example</th>
<th>1</th>
<th>2</th>
<th>3</th>
<th>4</th>
<th>5</th>
<th>6</th>
<th>7</th>
</tr>
</thead>
<tbody>
<tr>
<td>M C C - 04 - 0450 - 01 - 00</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

### 1 Inverter family
- **M** Mobile Inverter

### 2 Control module build
- **C** Low Voltage - 24 to 96 VDC

### 3 Frame size
- **C**
- **D** MC Series
- **E**
- **F**

### 4 Operating voltage
**Low Voltage MC Series Inverter**
- **02** 24 VDC
- **03** 36 VDC
- **04** 48 VDC
- **08** 80 VDC
- **09** 96 VDC

### 5 Peak current ratings (2 min)
**24 VDC Nominal Voltage**
- 0180 180 A - MC Series Frame C
- 0250 250 A - MC Series Frame C
- 0375 375 A - MC Series Frame C

**36 VDC Nominal Voltage**
- 0500 500 A - MC Series Frame D
- 0650 650 A - MC Series Frame E
- 0800 800 A - MC Series Frame F

**48 VDC Nominal Voltage**
- 0200 200 A - MC Series Frame C
- 0350 350 A - MC Series Frame C
- 0450 450 A - MC Series Frame D
- 0550 550 A - MC Series Frame E
- 0600 600 A - MC Series Frame E
- 0650 650 A - MC Series Frame F

**80 VDC Nominal Voltage**
- 0175 175 A - MC Series Frame C
- 0250 250 A - MC Series Frame C
- 0350 350 A - MC Series Frame D
- 0450 450 A - MC Series Frame E
- 0550 550 A - MC Series Frame F
- 0650 650 A - MC Series Frame F

**96 VDC Nominal Voltage**
- 0550 550 A - MC Series Frame F
- 0650 650 A - MC Series Frame F

### 6 Branding
- **01** Parker branded

### 7 Special options
- **00** Version for PMAC and induction motors
Full Voltage Range Mobile Drives - MD Drives

Overview

Description
Parker MD Series represents the latest design in compact motor controllers. With a compact, rugged and cost effective design these reliable controllers are intended to meet the high performance requirements of on-road and off-road electric vehicles (EV) and Hybrid Electric Vehicles (HEV).

Thanks to the high efficiency it is possible to integrate these controllers into very tight spaces without sacrificing performance. Its high voltage range, up to 800VDC, is well matched to the needs of the automotive and commercial transport markets. The same hardware platform handles both AC Induction and Permanent Magnet AC motor technologies.

Product Features
- Supports both PMAC and AC motors
- Up to 800 VDC peak supply voltage
- Up to 225 kW peak power output *
- Up to 90 kW continuous power output *
- Advanced flux vector control
- Integrated logic circuit
- Includes an additional dedicated safety supervisory processor (sizes MD-4A, 4B, 4C)
- Safety interlock pulsed enable signal (sizes MD-4A, 4B, 4C)
- Autocheck system diagnostic
- Hardware & software failsafe watchdog operation
- Integrated fuse holder (sizes MD-42, 44, 46)

Applications
- Utility vehicles
- Handling equipment, handling gantries
- Refuse Truck
- Bus and Coach
- City van
- Turf care
- Street sweepers
- Agricultural implements, tractors
- Other hydraulic pump control

Technical characteristics - overview

<table>
<thead>
<tr>
<th>Model</th>
<th>MD</th>
</tr>
</thead>
<tbody>
<tr>
<td>Motor type</td>
<td>AC induction + PMAC</td>
</tr>
<tr>
<td>Nominal voltage</td>
<td>24-800 VDC</td>
</tr>
<tr>
<td>Max 10 sec current</td>
<td>780 Arms</td>
</tr>
<tr>
<td>Switching freq.</td>
<td>8 kHz</td>
</tr>
<tr>
<td>Protection</td>
<td>IP66 (sizes MD-42, 44, 46)</td>
</tr>
<tr>
<td></td>
<td>IP6k9k and IP67 protection (sizes MD-4A, 4B, 4C)</td>
</tr>
<tr>
<td>Environment, Sizes MD-4B, 4C</td>
<td>ISO 16750</td>
</tr>
<tr>
<td>Safety Sizes MD-4B, 4C</td>
<td>Electrical safety to ISO 6494, IEC 60664 and UL840</td>
</tr>
<tr>
<td></td>
<td>Functional safety to ISO26262</td>
</tr>
<tr>
<td></td>
<td>Pulsed safety enable input</td>
</tr>
<tr>
<td></td>
<td>Pulsed status output</td>
</tr>
<tr>
<td>Sizes MD-4A</td>
<td>HVIL (High Voltage Interlock H/W &amp; S/W)</td>
</tr>
<tr>
<td></td>
<td>Designed to meet the electrical isolation of electrically propelled vehicles ISO 6469</td>
</tr>
<tr>
<td>Cooling</td>
<td>Cold plate cooling (low voltage sizes MD-42, 44, 46)</td>
</tr>
<tr>
<td></td>
<td>Water Glycol cooling (high voltage sizes MD-4A, 4B, 4C)</td>
</tr>
</tbody>
</table>

* with a cooling liquid temperature of 65°C
## Technical Data

<table>
<thead>
<tr>
<th>Part number</th>
<th>Nominal Battery Voltage</th>
<th>Max Operating Voltage</th>
<th>Min Operating Voltage</th>
<th>Continuous Current (60 min)</th>
<th>Peak Current (2 min)</th>
<th>Peak Current (10 sec)</th>
<th>Weight</th>
</tr>
</thead>
<tbody>
<tr>
<td>MD-42-02-300-00</td>
<td>24-36</td>
<td>52.2</td>
<td>12.7</td>
<td>120</td>
<td>300</td>
<td>360</td>
<td>1.3</td>
</tr>
<tr>
<td>MD-44-02-450-00</td>
<td>180</td>
<td>450</td>
<td>540</td>
<td>2.7</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>MD-46-02-650-00</td>
<td>260</td>
<td>650</td>
<td>780</td>
<td>4.6</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>MD-42-04-275-00</td>
<td>36-48</td>
<td>69.6</td>
<td>19.3</td>
<td>110</td>
<td>275</td>
<td>330</td>
<td>1.3</td>
</tr>
<tr>
<td>MD-44-04-450-00</td>
<td>180</td>
<td>450</td>
<td>540</td>
<td>2.7</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>MD-46-04-650-00</td>
<td>260</td>
<td>650</td>
<td>780</td>
<td>4.6</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>MD-42-08-180-00</td>
<td>72-80</td>
<td>116</td>
<td>39.1</td>
<td>75</td>
<td>180</td>
<td>215</td>
<td>1.3</td>
</tr>
<tr>
<td>MD-44-08-350-00</td>
<td>140</td>
<td>350</td>
<td>420</td>
<td>2.7</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>MD-46-08-550-00</td>
<td>220</td>
<td>550</td>
<td>660</td>
<td>4.6</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>MD-44-12-300-00</td>
<td>96-120</td>
<td>150</td>
<td>48</td>
<td>120</td>
<td>300</td>
<td>360</td>
<td>2.7</td>
</tr>
<tr>
<td>MD-4A-80-024-00</td>
<td>200-800</td>
<td>-</td>
<td>-</td>
<td>19</td>
<td>24 (1 min)</td>
<td>-</td>
<td>3.7</td>
</tr>
<tr>
<td>MD-4A-80-053-00</td>
<td>200-800</td>
<td>-</td>
<td>-</td>
<td>33</td>
<td>53 (1 min)</td>
<td>-</td>
<td>2.3</td>
</tr>
<tr>
<td>MD-4B-40-300-00</td>
<td>128-400</td>
<td>-</td>
<td>-</td>
<td>120</td>
<td>250</td>
<td>300</td>
<td>10</td>
</tr>
<tr>
<td>MD-4C-80-400-00</td>
<td>50-800</td>
<td>-</td>
<td>-</td>
<td>120</td>
<td>300</td>
<td>450</td>
<td>10.7</td>
</tr>
</tbody>
</table>

Note: Switching Frequency = 16 kHz

## Operating temperature

<table>
<thead>
<tr>
<th>Sizes</th>
<th>Temperature range (without derating)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Sizes MD-42, 44, 46</td>
<td>-40°C to +85°C</td>
</tr>
<tr>
<td>Size MD-4A-80-024</td>
<td>Air Cooled - Ambient -40°C up to +45°C full operation</td>
</tr>
<tr>
<td>Size MD-4A-80-053, 4B, 4C</td>
<td>Water/Glycol coolant - Full operation up to 65°C</td>
</tr>
</tbody>
</table>
Dimensions

MD-42

71
187
151

MD-44

78
168
227

MD-46

86
305
170

MD-4A-80-024
Full Voltage Range Mobile Drives - MD Drives
Dimensions

**MD-4A-80-053**

**MD-4B**

**MD-4C**
Product Details

MULTIPLE MOTOR FEEDBACK OPTIONS
MD drive provides a number of motor feedback possibilities from a range of hardware inputs and software control, allowing a great deal of flexibility.

- Absolute UVW encoder input (ACIM)
- Absolute Sin/Cos encoder input (MD-42, 44, 46)
- Incremental AB encoder input (ACIM)
- Resolver input (MD-4A, 4B, 4C)
- Programmable 5V to 10V encoder power supply

INTEGRATED I/O
MD drive includes a fully-integrated set of inputs and outputs (I/O) designed to handle a wide range of vehicle requirements. This eliminated the need for additional external I/O modules or vehicle controllers and connectors.

<table>
<thead>
<tr>
<th>Low voltage frame sizes MD-42, 44, 46</th>
<th>High voltage frame sizes MD-4A, 4B, 4C</th>
</tr>
</thead>
<tbody>
<tr>
<td>8 digital inputs</td>
<td>12V or 24V nominal supply</td>
</tr>
<tr>
<td>2 analogue inputs (can be configured</td>
<td>All I/O protected to 40V (size 8,10,hvlp))</td>
</tr>
<tr>
<td>3 contactor/solenoid outputs</td>
<td>4 analogue inputs 0-10V</td>
</tr>
<tr>
<td></td>
<td>4 digital inputs</td>
</tr>
<tr>
<td></td>
<td>3 power supplies 0-10V 100mA (2 for size A)</td>
</tr>
<tr>
<td></td>
<td>3 digital outputs PWM max 2A (2 for size A)</td>
</tr>
</tbody>
</table>

OTHER FEATURES

- A CANopen bus allows easy interconnection of drives and devices such as displays and driver controls.
- The CANbus allows the user to wire the vehicle to best suit vehicle layout since inputs and outputs can be connected to any of the controllers on the vehicle and the desired status is passed over the CAN network to the relevant motor controller.
- The MD drive can dynamically change the allowed battery current by exchanging CAN messages with a compatible Battery Management System.
- Configurable as vehicle control master or motor slave.

CONFIGURATION TOOLS - D.V.T
Parker offers a range of configuration tools for the MD drive range with options for Windows based PC or calibrator handset unit. These tools provide a simple yet powerful means of accessing the CANopen bus for diagnostics or parameter adjustment. The handset unit features password protected access levels and a customized logo start-up screen.

<table>
<thead>
<tr>
<th>Order Code</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>USB-MD-00</td>
<td>Dongle + PC interface cable</td>
</tr>
<tr>
<td>MDINVERTER-LINK-CABLE (except MD-4A)</td>
<td>MD drive interface cable</td>
</tr>
</tbody>
</table>
## Full Voltage Range Mobile Drives - MD Drives

### Order Code

<table>
<thead>
<tr>
<th>Order example</th>
<th>1</th>
<th>2</th>
<th>3</th>
<th>4</th>
<th>5</th>
<th>6</th>
<th>7</th>
</tr>
</thead>
</table>

<table>
<thead>
<tr>
<th>Drive family</th>
<th>M</th>
<th>Drive</th>
<th>Gen4</th>
<th>Gen5</th>
<th>Frame Size</th>
<th>Max. Operating Voltage</th>
<th>Peak Current Rating (2 min)</th>
<th>Special options</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>00</td>
</tr>
<tr>
<td>2</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>4</td>
<td>5</td>
<td>6</td>
<td></td>
</tr>
<tr>
<td>3</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>6</td>
<td>7</td>
<td>8</td>
<td></td>
</tr>
<tr>
<td>4</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>9</td>
<td>10</td>
<td>11</td>
<td></td>
</tr>
<tr>
<td>5</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>12</td>
<td>13</td>
<td>14</td>
<td></td>
</tr>
<tr>
<td>6</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>15</td>
<td>16</td>
<td>17</td>
<td></td>
</tr>
<tr>
<td>7</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>18</td>
<td>19</td>
<td>20</td>
<td></td>
</tr>
</tbody>
</table>

- Drive family: M Mobile, D Drive
- Series: 4 Gen4, 5 Gen5
- Frame Size: Low voltage sizes (24-120 VDC) for 2, High voltage sizes (up to 800 VDC) for A
- Max. Operating Voltage: 02 24 VDC, 04 48 VDC, 08 80 VDC, 12 120 VDC, 40 400 VDC, 80 800 VDC
- Peak Current Rating (2 min): 024 24 Arms (1 min), 053 53 Arms (1 min), 180 180 Arms, 275 275 Arms, 300 300 Arms, 350 350 Arms, 400 400 Arms, 450 450 Arms, 550 550 Arms, 650 650 Arms
- Special options: 00 Standard
Related Products

Global Vehicle Motor (GVM)

Description
PMAC servomotors offer the best solution to meet the requirements of vehicle duty performance. The torque density and speed capabilities of Parker Permanent Magnet AC motors (PMAC) provide the speed and torque required to achieve breakthrough performance in a variety of vehicle platforms.

Product Features
- High efficiency
- Compactness (High power density)
- Can be used either as motor or generator
- Operating voltages available from 24 to 800 VDC

Electro-Hydraulic Pumps (EHP)

Description
The Electro-Hydraulic Pump (EHP) kits are designed for hybrid electric and all electric mobile applications. EHP systems consist of an electric motor directly coupled to an hydraulic pump controlled by a high performance mobile hardened drive. Parker’s global expertise in hydraulic, electric motor, and drive technologies is brought together in the EHP to create a system that has been optimally adapted to the customer requirements.

Product Features
- Complete Electro-Hydraulic Pump solutions
- Pre engineered system with fully validated pressure, flow and voltage data
- Wide range of motor/pump combinations to adapt to every battery pack

CFR - Low voltage induction motors

Description
This low cost air-cooled induction motors (ACIM) range has been specifically developed for battery-operated vehicles. Typically adapted for Electro-Hydraulic Pumps (EHP), the Parker’s product support team will work with pump division to coordinate mechanical solution.

Product Features
- Ruggedised low voltage induction motor
- Speed up to 3500 rpm
- Power up to 40 kW
- IP rating: IP20 to IP65
- Built-in thermal sensor for monitoring motor temperature
At Parker, we’re guided by a relentless drive to help our customers become more productive and achieve higher levels of profitability by engineering the best systems for their requirements. It means looking at customer applications from many angles to find new ways to create value. Whatever the motion and control technology need, Parker has the experience, breadth of product and global reach to consistently deliver. No company knows more about motion and control technology than Parker. For further info call 08000 27 27 5374

Parker’s Motion & Control Technologies

Aerospace
**Key Markets**
- Aeronautical services
- Commercial transports
- Commercial aircraft
- Helicopters
- Launch vehicles
- Military aircraft
- Power generation
- Regional transports
- Unmanned aerial vehicles

**Key Products**
- Control systems & actuators products
- Engine systems & components
- Fluid conveyance systems & components
- Fluid metering, delivery & automation devices
- Fuel systems & components
- Fuel tank systems
- Hydraulic systems & components
- Thermal management
- Wheels & brakes

Climate Control
**Key Markets**
- Agriculture
- Air conditioning
- Construction machinery
- Food & beverage
- Industrial machinery
- Life sciences
- Oil & gas
- Precision cooling
- Process
- Transportation

**Key Products**
- Accumulators
- Advanced actuators
- Air, controls
- Electric controllers
- Filler drives
- Hand shut-off valves
- Heat exchangers
- Hose & fittings
- Pressure regulating valves
- Regenerative distributors
- Safety relief valves
- Smart pumps
- Solenoid valves
- Thermostatic expansion valves

Electromechanical
**Key Markets**
- Aerospace
- Factory automation
- Life science & medical
- Machine tools
- Packaging machinery
- Paper machinery
- Plastic machinery & converting
- Primary metals
- Semiconductor & electronics
- Textile
- Wire & cable

**Key Products**
- AC/DC drives & systems
- Electric actuators, motor & drives
- Electrohydraulic actuation systems
- Electromechanical actuation systems
- Human machine interface
- Linear motors
- Step motors, servo motors, drives & controls
- Structural extrusions

Filtration
**Key Markets**
- Aerospace
- Food & beverage
- Industrial plant & equipment
- Life sciences
- Marine
- Mobile equipment
- Oil & gas
- Power generation & renewable energy
- Process
- Transportation
- Water purification

**Key Products**
- Analytical gas generators
- Compressed air filters & driers
- Engine air, coolant, fuel & oil filtration systems
- Fluid condition monitoring systems
- Hydraulic & lubrication filters
- Hydrogen, nitrogen & zero air generators
- Instrumentation filters
- Membrane & fiber filters
- Microfiltration
- Sterile air filtration
- Water deionization & purification filters & systems

Fluid & Gas Handling
**Key Markets**
- Aerial lift
- Agriculture
- Bulk chemical handling
- Construction machinery
- Food & beverage
- Industrial machinery
- Life sciences
- Marine
- Mining
- Mobile
- Oil & gas
- Renewable energy
- Transportation

**Key Products**
- Check valves
- Connectors for low pressure fluid conveyance
- Deep sea umbilicals
- Diagnostic equipment
- Hose couplings
- Industrial hose
- Mooring systems & power cables
- PTFE hose & tubing
- Quick couplings
- Rubber & thermoplastic hose
- Tubing & fittings
- Tubing & plastic fittings

Hydraulics
**Key Markets**
- Aerial lift
- Agriculture
- Alternative energy
- Construction machinery
- Food & beverage
- Industrial machinery
- Life sciences
- Marine
- Material handling
- Mining
- Oil & gas
- Power generation
- Refuse vehicles
- Renewable energy
- Trucks & hydraulics
- Tilt equipment

**Key Products**
- Accumulators
- Cartridge valves
- Electromagnetic actuators
- Human machine interfaces
- Hybrid drives
- Hydraulic cylinders
- Hydraulic motors & pumps
- Hydraulic systems
- Hydraulic valves & controls
- Hydraulic steering
- Integrated hydraulic circuits
- Power take-offs
- Power units
- Rotary actuators
- Sensors

Pneumatics
**Key Markets**
- Aerospace
- Conveyer & material handling
- Factory automation
- Life science & medical
- Machine tools
- Packaging machinery
- Transportation & automotive

**Key Products**
- Air preparation
- Boost fittings & valves
- Manifolds
- Pneumatic actuators
- Pneumatic actuators & grippers
- Pneumatic valves & controls
- Quick disconnects
- Rotary actuators
- Rubber & thermoplastic hose & couplings
- Structural extrusions
- Thermoplastic tubing & fittings
- Vacuum generators, cups & sensors

Process Control
**Key Markets**
- Alternative fuels
- Biopharmaceuticals
- Chemical & refining
- Food & beverage
- Marine & shipbuilding
- Medical & dental
- Microelectronics
- Nuclear Power
- Oil & gas
- Power generation
- Pulp & paper
- Rice & wheat
- Water/wastewater

**Key Products**
- Analytical instruments
- Analytical sample conditioning products
- Chemical injection fittings
- & valves
- Fluoropolymer chemical delivery fittings, valves & pumps
- High purity gas delivery fittings, valves, regulators & digital flow controllers
- Industrial mass flow meters/ controllers
- Permanent no-weld tube fittings
- Pressure reducing valves
- Process control valves, valves, regulators & manifold valves

Sealing & Shielding
**Key Markets**
- Aerospace
- Chemical processing
- Construction
- Fluid power
- General industrial
- Information technology
- Life sciences
- Microelectronics
- Military
- Oil & gas
- Power generation
- Renewable energy
- Telecommunications
- Transportation

**Key Products**
- Dynamic seals
- Elastomeric o-rings
- Electro-mechanical instrument design & assembly
- EMI shielding
- Extruded & precision cut fabricated elastomeric seals
- High temperature metal seals
- Homogenous & layered elastomeric seals
- Medical device fabrication & assembly
- Metallic & plastic retained composite seals
- Shielded optical windows
- Silicone tubing & extrusions
- Thermal management
- Vibration damping