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.

Local Manufacturing and Support

Parker provides sales assistance and local technical support through a network of dedicated sales teams and authorized technical distributors throughout North American and around the globe. For contact information, please refer to the sales offices on the back cover of this document or visit www.parker.com
Parker Automation Controller - PAC

Powerful, integrated, and designed for the global machine market, the Parker Automation Controller (PAC) provides OEMs with a standards-based automation solution designed to tackle the most demanding applications. The PAC consolidates advanced logic, multi-axis motion, signal handling, and web-published visualization into one performance driven solution, thus eliminating the need for unnecessary hardware and communication links, and increasing developer efficiency.

The PAC employs the industry-leading EtherCAT communication protocol for motion, I/O, and third-party device connectivity, and combined with the Parker Automation Manager IDE for application development, the PAC provides OEMs with an engineered solution for the most demanding applications; a single, intuitive environment for application development; industry standard programming; machine-to-machine communication; network separation; and even Intellectual Property (IP) protection methods among other features.

With the standard dual LAN capability for network separation, built-in OPC Server, Modbus TCP functionality, and the ability to integrate directly into Ethernet/IP and Profinet networks, the PAC provides unprecedented connectivity for complimentary devices and network isolation for IT professionals.

The solid state design is precisely engineered for demanding industrial environments. The powerful, yet energy efficient Intel® Atom™ processor allows for fanless operation while supporting dual-cores, 64-bit instructions, and Hyperthreading technology. Coupled with the removable, solid state SD storage media, all moving parts have been eliminated for a robust, industrial grade control solution.

**Hardware**
- Intel Atom Dual-core, 1.60GHz, 64-bit
- 1GB DDR3 SDRAM
- Fan-less
- SD Application Memory
- Local & Remote I/O
- DIN Rail Mounting

**Software**
- IEC61131-3 Programming
- PLCoopen Motion Control
- DIN 66025 CNC G-code
- Simulation Runtime Engine
- Web-configuration Tool
- Custom Libraries
- Extensible, Reusable Code

**Communications**
- EtherCAT
- Ethernet/IP
- Profinet
- Profibus
- OPC Server
- Modbus TCP
- Dual LANs
## Parker Automation Controller - PAC

### PAC Specifications

<table>
<thead>
<tr>
<th>Specification</th>
<th>Details</th>
</tr>
</thead>
<tbody>
<tr>
<td>Processor</td>
<td>Intel® Atom CPU, 1.6 GHz, Dual Core, 64bit, 1 MB L2 Cache</td>
</tr>
<tr>
<td>Memory</td>
<td>Up to 1GB DDR3 SDRAM, 1066 MHz, PC3-8500, 204-pin SODIMM Socket</td>
</tr>
<tr>
<td>Storage</td>
<td>2GB Secure Digital Card (SD)</td>
</tr>
<tr>
<td>Retentive Memory</td>
<td>256kB, 512kB</td>
</tr>
<tr>
<td>BIOS</td>
<td>Insyde H2O</td>
</tr>
<tr>
<td>Input Voltage</td>
<td>24 VDC (-15%/+25%), SELV, 1.2A, 29W, Req. Class 2 Power Source, Overvoltage Cat. 1</td>
</tr>
<tr>
<td>Fuse</td>
<td>Littelfuse Nano SMF Slow Blow Type -- Littelfuse Part Number R454002</td>
</tr>
<tr>
<td>Shock Rating</td>
<td>10g peak, 11ms (operating); 30g peak, 11ms (non-operating)</td>
</tr>
<tr>
<td>Operating Vibration</td>
<td>10-500Hz: 2grms random</td>
</tr>
<tr>
<td>Altitude</td>
<td>10,000 ft. (3048m)</td>
</tr>
<tr>
<td>Relative Humidity</td>
<td>0% to 95% non-condensing</td>
</tr>
<tr>
<td>Operating Temperature</td>
<td>32 to 122 °F (0-50 °C) Ambient</td>
</tr>
<tr>
<td>Storage Temperature</td>
<td>-13 to 158 °F (-25 to 70 °C)</td>
</tr>
<tr>
<td>Environmental</td>
<td>IP20, RoHS Compliant</td>
</tr>
<tr>
<td>Heat Dissipation</td>
<td>5.0 W max. w/o optional communications module, 5.8 W maximum w/ optional module</td>
</tr>
<tr>
<td>Weight</td>
<td>1.45 lbs (0.66kgs) w/o optional comm. module; 1.65 lbs (0.75kgs) w/ optional module</td>
</tr>
<tr>
<td>Dimensions</td>
<td>3.27&quot;H x 4.93&quot;W x 8.02&quot;L w/o optional comm. module; 3.53&quot;H w/ optional module</td>
</tr>
<tr>
<td>Mounting</td>
<td>35 mm DIN rail (top-hat rail)</td>
</tr>
<tr>
<td>Ports</td>
<td>2x RJ-45 10/100/1000BaseT Ethernet; 1x RJ45 100Mbit/s EtherCAT supporting IEEE1588 distributed clocks; 2 x USB 2.0 Host Type A</td>
</tr>
</tbody>
</table>

### PAC Standards and Conformance

<table>
<thead>
<tr>
<th>Test</th>
<th>Specification</th>
</tr>
</thead>
<tbody>
<tr>
<td>Voltage Fluctuations and Flicker</td>
<td>EN 61000-3-3:2008, IEC 61000-3-3:2008</td>
</tr>
<tr>
<td>Electrostatic Discharge Immunity</td>
<td>IEC 61000-4-2:2008</td>
</tr>
<tr>
<td>Radiated Electromagnetic Field Immunity</td>
<td>IEC 61000-4-3:2010</td>
</tr>
<tr>
<td>Electrical Fast Transient Burst Immunity</td>
<td>IEC 61000-4-4:2012</td>
</tr>
<tr>
<td>Surge Immunity</td>
<td>IEC 61000-4-5:2005</td>
</tr>
<tr>
<td>Radio Frequency Common Mode Immunity</td>
<td>IEC 61000-4-6:2008</td>
</tr>
<tr>
<td>Power Frequency Magnetic Field Immunity</td>
<td>IEC 61000-4-8:2009</td>
</tr>
<tr>
<td>Voltage Intermittent Immunity</td>
<td>IEC 61000-4-11:2004</td>
</tr>
<tr>
<td>Radiated &amp; Conducted Emissions</td>
<td>EN 55011:2009 + A1:2010</td>
</tr>
<tr>
<td>CISPR 11 Group 1, Class A</td>
<td>CISPR 11:2009 + A1:2010</td>
</tr>
<tr>
<td>†† Part 1 General Requirements</td>
<td>EN61010-1:2010</td>
</tr>
<tr>
<td>†† Part 2-201 Particular Requirements for Control Equipment</td>
<td>EN61010-2-201:2013</td>
</tr>
<tr>
<td>‡Part 1: General Requirements</td>
<td>CAN/CSA-C22.2 No. 61010-1, 3rd Ed, 2012-04</td>
</tr>
<tr>
<td>†‡ Part 2-201: Particular requirements for control equipment</td>
<td>UL 61010-2-201</td>
</tr>
</tbody>
</table>

†Safety Requirements ‡Electrical Equipment for Measurement, Control and Laboratory use.
The PAC I/O System comprises a variety of modules for digital, analog and temperature signals as well as communication interfaces. The modules connect directly to the controller via the built-in EtherCAT bus for local architectures and are extended to remote locations via the extender and bus coupler modules, thus supporting both local and distributed I/O architectures.

PAC I/O modules feature a removable cage-clamp terminal design which provides for easy wiring and assembly and allows for the removal and insertion of modules without interfering with wiring; LED status indicators for the EtherCAT bus, I/O, power and each signal channel; front-face shield-grounding to the din-rail; removable label inserts; easy access front mounted module disconnects; and laser-etched identification and schematic information.

PAC I/O communicates natively on the EtherCAT bus and is unencumbered by protocol converters; therefore it provides the full functionality and throughput of high-speed EtherCAT to meet the most demanding I/O requirements.

### PAC I/O Modules

<table>
<thead>
<tr>
<th>Module Type</th>
<th>Part Number</th>
<th>PACIO Description</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Bus Coupler</strong></td>
<td>PACIO-400-00</td>
<td>PACIO EtherCAT Bus coupler, 3 A</td>
</tr>
<tr>
<td><strong>Digital I/O</strong></td>
<td>PACIO-450-02</td>
<td>PACIO DI16/DO8 (16 inputs/8 outputs), 1 A</td>
</tr>
<tr>
<td></td>
<td>PACIO-450-03</td>
<td>PACIO DI16/DO16 (16 inputs/16 outputs), 1 ms delay, 0.5 A</td>
</tr>
<tr>
<td></td>
<td>PACIO-450-13</td>
<td>PACIO DI16/DO16 (16 inputs/16 outputs), 1 ms delay, 0.5 A Low-side</td>
</tr>
<tr>
<td></td>
<td>PACIO-451-02</td>
<td>PACIO DI32 (32 inputs), 1 ms delay</td>
</tr>
<tr>
<td></td>
<td>PACIO-451-03</td>
<td>PACIO DI16 (16 inputs), 1 ms delay</td>
</tr>
<tr>
<td></td>
<td>PACIO-452-05</td>
<td>PACIO DI8/DO8 (8 inputs/8 outputs), 1 ms delay, 0.5 A</td>
</tr>
<tr>
<td></td>
<td>PACIO-452-01</td>
<td>PACIO DO16 (16 outputs), 0.5 A</td>
</tr>
<tr>
<td></td>
<td>PACIO-452-02</td>
<td>PACIO DO8 (8 outputs), 1 A</td>
</tr>
<tr>
<td><strong>Analog</strong></td>
<td>PACIO-441-01</td>
<td>PACIO AI4-mA (4 single-ended analog input module), 12 Bit resolution</td>
</tr>
<tr>
<td></td>
<td>PACIO-441-02</td>
<td>PACIO AI4/8-VDC (4 differential/8 single-ended analog input module), 13 Bit</td>
</tr>
<tr>
<td></td>
<td>PACIO-442-02</td>
<td>PACIO AO4-VDC/mA (4 analog output module), 12 Bit resolution</td>
</tr>
<tr>
<td><strong>Temperature</strong></td>
<td>PACIO-443-01</td>
<td>PACIO AI4-Pt/Ni100 (4 analog inputs, 70 to 300 ohm resistance), 16 Bit</td>
</tr>
<tr>
<td></td>
<td>PACIO-443-03</td>
<td>PACIO AI4-Pt/Ni1000 (4 analog inputs, 70 to 3000 ohm resistance), 16 Bit</td>
</tr>
<tr>
<td><strong>Counter</strong></td>
<td>PACIO-454-01</td>
<td>PACIO Counter/Enc (encoder counter module)</td>
</tr>
<tr>
<td><strong>Interfaces</strong></td>
<td>PACIO-455-03</td>
<td>PACIO Profibus DP Slave Module</td>
</tr>
<tr>
<td></td>
<td>PACIO-400-02</td>
<td>PACIO Extender 2 Port (EtherCAT I/O extender)</td>
</tr>
<tr>
<td><strong>Accessories</strong></td>
<td>PACIO-412-01</td>
<td>PACIO Shield 2x8 mm</td>
</tr>
<tr>
<td></td>
<td>PACIO-412-02</td>
<td>PACIO Shield 14 mm</td>
</tr>
<tr>
<td></td>
<td>PACIO-411-00</td>
<td>Power Distribution Module (distributes 0 VDC or 24 VDC)</td>
</tr>
</tbody>
</table>
Parker Automation Controller - PAC

PAC I/O Specifications

<table>
<thead>
<tr>
<th>Fieldbus</th>
<th>EtherCAT 100Mb/s</th>
</tr>
</thead>
<tbody>
<tr>
<td>Dimensions</td>
<td>25mm x 120mm x 90mm (W x H x D)</td>
</tr>
<tr>
<td>Housing Mount</td>
<td>Aluminum</td>
</tr>
<tr>
<td>Shield</td>
<td>Front face of module housing thru to DIN rail</td>
</tr>
<tr>
<td>Installation</td>
<td>35mm DIN rail (top-had rail)</td>
</tr>
<tr>
<td>I/O Connection</td>
<td>Spring-assisted combi-plug terminal w/ mechanical ejector, 4...36-pin</td>
</tr>
<tr>
<td>Signal Indication</td>
<td>LEDs: located next to the signal's terminal connection</td>
</tr>
<tr>
<td>Diagnosis</td>
<td>LEDs: bus state, module state, broken wire/excessive current</td>
</tr>
<tr>
<td>Number of Channels</td>
<td>Up to 32 digital I/Os on every module, up to 8 analog channels per module</td>
</tr>
<tr>
<td>Supply Voltage</td>
<td>24 VDC -20%/+25%</td>
</tr>
<tr>
<td>Number of I/O Modules</td>
<td>20 local and then 20 per bus coupler (total max. power consumption per station: 3A</td>
</tr>
<tr>
<td>Density</td>
<td>Up to 32 digital I/Os per module; up to 8 analog channels per module</td>
</tr>
<tr>
<td>Electrical installation</td>
<td>Modules electrically insulated from one another and from the bus</td>
</tr>
<tr>
<td>Storage Temperature</td>
<td>-25°C ... + 70°C</td>
</tr>
<tr>
<td>Operating Temperature</td>
<td>0°C ... +50°C</td>
</tr>
<tr>
<td>Relative Humidity</td>
<td>5% ... 95% non-condensing</td>
</tr>
<tr>
<td>Protection</td>
<td>IP20</td>
</tr>
<tr>
<td>Noise Immunity</td>
<td>Zone B, EN 61131-2, earth grounded DIN rail in earth grounded cabinet</td>
</tr>
<tr>
<td>CE Compliance</td>
<td>2004/108/EC Electromagnetic Compatibility</td>
</tr>
<tr>
<td>UL</td>
<td>UL508</td>
</tr>
<tr>
<td>RoHS</td>
<td>RoHS Compliant</td>
</tr>
</tbody>
</table>

Accessories and Options

Communication Options

The Parker Automation Controller (PAC) employs the industry leading EtherCAT communication protocol for motion, I/O, and 3rd party device connectivity. Along with EtherCAT, each unit also comes standard with Modbus TCP, an OPC Server, and dual LANs for network separation.

To compliment the standard protocols, the PAC provides options for Ethernet/IP, Profinet, and Profibus, and therefore the PAC can integrate directly into Ethernet/IP and Profinet networks for machine-to-machine communication.

- EtherCAT
- Ethernet/IP
- Profinet
- Profibus
- Modbus TCP
- OPC Server
- Dual LANs
Smart and powerful, Parker Automation Manager is the single integrated development environment for programming complex logic, multi-axis motion, signal handling, and web-published visualizations.

With Automation Manager, engineers can leverage their existing knowledge and work smarter, more efficient and more effective than ever with the full suite of IEC 61131-3 programming languages, PLCopen Motion Control, Parts I and II, and g-code conforming to the DIN66025 standard. This standards-based approach provides a common platform for control engineers and flattens the learning curve, thus saving OEMs time and money.

The common platform approach is complemented by a powerful simulation engine for logic and motion that allows for faster development and by a complete suite of debugging tools, including powerflow; inline variable forcing, watch, and trending; system logging; and breakpoints for logic analysis.

Automation Manager supports reusable, extensible software; object-oriented programming techniques; and even custom library creation for libraries that can be deployed as compiled— and optionally licensed—code and deployed to protect the Intellectual Property (IP) of OEMs. Engineers can now manage an entire product line in one project by including multiple hardware configurations and deploying the appropriate reusable software packages to specific application containers. This method allows OEMs to maintain their program files in one project and make code changes in one place to affect all versions of a particular machine. Thus machine builders now have a development platform specifically designed to support modular machines and valuable add-on software modules.
Parker Automation Controller - PAC

Dimensions

<table>
<thead>
<tr>
<th>PAC Controller</th>
<th>Inches (mm)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>3.34 [84.9]</td>
</tr>
<tr>
<td></td>
<td>28 [710]</td>
</tr>
<tr>
<td></td>
<td>4.90 [124.0]</td>
</tr>
<tr>
<td></td>
<td>4.80 [122.0]</td>
</tr>
<tr>
<td></td>
<td>6.98 [128.0]</td>
</tr>
<tr>
<td></td>
<td>4.80 [122.0]</td>
</tr>
<tr>
<td></td>
<td>3.12 [79.2]</td>
</tr>
<tr>
<td></td>
<td>4.80 [122.0]</td>
</tr>
<tr>
<td>3.27 [83.0]</td>
<td>2.73 [69.4]</td>
</tr>
<tr>
<td>2.08 [52.8]</td>
<td>1.31 [33.2]</td>
</tr>
<tr>
<td>2.73 [69.4]</td>
<td>1.25 [31.7 mm]</td>
</tr>
<tr>
<td>0.96 [25.0 mm]</td>
<td>4.00 [101.6 mm]</td>
</tr>
<tr>
<td>3.12 [79.2 mm]</td>
<td>4.80 [122.0 mm]</td>
</tr>
</tbody>
</table>

I/O Modules
Network Architecture

Machine or Network

Machine or Network

EtherCAT

Ethernet TCP/IP

Plant Network

Machine Network

Servos

VFDs

Remote I/O

3rd Party Devices

3rd Party Devices

LabView

PAM Development

PAC Terminal
## Ordering Information

<table>
<thead>
<tr>
<th>1</th>
<th>Series</th>
<th>PAC320</th>
<th>Controller</th>
</tr>
</thead>
<tbody>
<tr>
<td>2</td>
<td>Software</td>
<td>P</td>
<td>IEC only</td>
</tr>
<tr>
<td></td>
<td></td>
<td>M</td>
<td>IEC, PLCopen Motion</td>
</tr>
<tr>
<td></td>
<td></td>
<td>C</td>
<td>IEC, PLCopen Motion, CNC</td>
</tr>
<tr>
<td>3</td>
<td>Visualization</td>
<td>X</td>
<td>Embedded Xpress Web-visualization</td>
</tr>
<tr>
<td></td>
<td></td>
<td>W</td>
<td>Web-visualization for CNC</td>
</tr>
<tr>
<td>4</td>
<td>Communication Options</td>
<td>N</td>
<td>No Interface</td>
</tr>
<tr>
<td></td>
<td></td>
<td>E</td>
<td>Ethernet/IP</td>
</tr>
<tr>
<td></td>
<td></td>
<td>P</td>
<td>Profinet Device</td>
</tr>
<tr>
<td></td>
<td></td>
<td>B</td>
<td>Ethernet/IP, PROFINET Device</td>
</tr>
<tr>
<td>5</td>
<td>Retentive Memory</td>
<td>2</td>
<td>256k Bytes</td>
</tr>
<tr>
<td>6</td>
<td>Processor</td>
<td>1</td>
<td>1.60 GHz Dual Core Intel® N2600</td>
</tr>
<tr>
<td>7</td>
<td>Agency Approvals</td>
<td>3</td>
<td>UL/cUL/CE</td>
</tr>
<tr>
<td>8</td>
<td>Reserved</td>
<td>A</td>
<td>Reserved</td>
</tr>
</tbody>
</table>

Select an option from each numbered field to create a complete model order code.

**Order Example:** PAC320 – M W N 2 1 – 3 A
Other Parker Automation Solutions

ETT - Electric Tubular Motors
Parker’s rod style linear actuators are offered with either a screw or tubular linear motor drive train, and are available in a variety of strokes. Having the flexibility between these two drive trains give OEM’s the flexibility to either select an actuator which will deliver high speed and acceleration or an actuator that will deliver thrust which rivals that of traditional fluid power actuators. Given this versatility Parker’s rod style actuators can be found in applications ranging from semi-conductor, food processing, entertainment, and traditional machine tool.

HMR - High Moment Rodless
Parker Hannifin offers a wide breadth of high moment rodless linear actuators which are driven with a screw, belt or linear motor. In addition to a wide variety of drive train technologies, these actuators are also offered with a vast array of bearing technologies to suit the needs of the application. Any of these actuator’s can be configured into a multi-axis robotic system, which provides for cost effective automation across industries, including life sciences, semi-conductor, electronics assembly, and automated test or assembly.

MPP/MPE Servo Motors
The MPP Series of brushless servo motors features a segmented lamination design that provides for a very high torque-to-inertia ratio resulting in the highest acceleration rates of any Parker motor. MPPs also include high-performance Neodymium magnets, a potted stator design for thermal efficiency, and multiple feedback options. MPP motors are available in 92, 100, 115, 142, 190, and 270 mm frame sizes with peak torque ratings up to 402 Nm.

Compax3 EtherCAT Servo Drives
Compax3 servo drives combine a high-performance, digital design with industrial ruggedness and expansive power capabilities. Designed specifically for industrial applications with heavy duty features such as built-in regeneration capabilities and AC input line filtering, the wide variety of power levels—up to 155 A RMS—ensures that no application is too large for the Compax3 family.

IPS Structural Aluminum
IPS is a complete line of structural aluminum and linear motion extrusions created to build innovative solutions in machine building, safety guarding, workstations, and other unlimited industrial applications.

Xpress HMI
Xpress HMI is Parker’s award winning web-published HMI product for interfacing not only Parker’s Automation Controller, but also third-party controllers to the world. With it’s intuitive design interface, numerous drag-and-drop objects, and dozens of built-in drivers, Xpress is combines a powerful graphics interface with an intuitive design environment for quick development and an award winning machine front-end.
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 information call: 1 800 C-Parker (1 800 272 7537)

**Motion & Control Technologies...**

**Aerospace**
- **Key Markets**
  - Airlift
  - Agriculture
  - Bilk chemical handling
  - Construction machinery
  - Food & beverage
  - Fuel & gas delivery
  - Industrial machinery
  - Life sciences
  - Marine
  - Mining
  - Mobile
  - Oil & gas
  - Renewable energy
  - Transportation
- **Key Products**
  - Check valves
  - Couplings & hose assemblies
  - Diaphragm pumps
  - Electric actuators & controls
  - Engine systems
  - Fluid conveyance systems & components
  - Fluid metering, delivery & atomization devices
  - Fuel systems & components
  - Fuel tank systems
  - Thermostat controls
  - Wheels & brakes

**Climate Control**
- **Key Markets**
  - Agriculture
  - Air conditioning
  - Construction machinery
  - Food & beverage
  - Industrial machinery
  - Life sciences
  - Oil & gas
  - Precision cooling & heating systems
  - Process refrigeration
  - Transportation
- **Key Products**
  - Accumulators
  - Advanced actuators
  - CO2 controls
  - Electronic controllers
  - Filtered dryers
  - Hand-operated valves
  - Heat exchangers
  - Hose & fittings
  - Pressure regulating valves
  - Refrigerant distributors
  - Safety relief valves
  - Smart pumps
  - Solenoid valves
  - Thermostatic expansion valves

**Electromechanical**
- **Key Markets**
  - Airlift
  - Aerospace
  - Biochemicals & pharmaceuticals
  - Chemical & refining
  - Food & beverage
  - Marine & shipbuilding
  - Medical & dental
  - Nuclear Power
  - Offshore oil exploration
  - Industrial motors
  - Stepper motors, servo motors, drives & controls
  - Structural extrusions
- **Key Products**
  - AC/DC drives & systems
  - Electric actuators, gantry robots & sliders
  - Electrohydraulic actuators
  - Accumulators
  - Advanced actuators
  - CO2 controls
  - Electronic controllers
  - Filtered dryers
  - Hand-operated valves
  - Heat exchangers
  - Hose & fittings
  - Pressure regulating valves
  - Refrigerant distributors
  - Safety relief valves
  - Smart pumps
  - Solenoid valves
  - Thermostatic expansion valves

**Fluid & Gas Handling**
- **Key Markets**
  - Airlift
  - Agriculture
  - Bilk chemical handling
  - Construction machinery
  - Food & beverage
  - Fuel & gas delivery
  - Industrial machinery
  - Life sciences
  - Marine
  - Mining
  - Mobile
  - Oil & gas
  - Renewable energy
  - Transportation
- **Key Products**
  - Check valves
  - Couplings & hose assemblies
  - Diaphragm pumps
  - Electric actuators & controls
  - Engine systems
  - Fluid conveyance systems & components
  - Fluid metering, delivery & atomization devices
  - Fuel systems & components
  - Fuel tank systems
  - Thermostat controls
  - Wheels & brakes

**Hydraulics**
- **Key Markets**
  - Airlift
  - Agriculture
  - Alternative energy
  - Construction machinery
  - Forestry
  - Industrial machinery
  - Machine tools
  - Marine
  - Material handling
  - Mining
  - Oil & gas
  - Power generation
  - Refuse vehicles
  - Renewable energy
  - Truck hydraulics
  - Turf equipment
- **Key Products**
  - Accumulators
  - Cartridge valves
  - Electrohydraulic actuators
  - Human machine interfaces
  - Hybrid drives
  - Hydraulic cylinders
  - Hydraulic motors & pumps
  - Hydraulic systems
  - Hydraulic valves & controls
  - Hydrostatic steering
  - Integrated hydraulic circuits
  - Power take-offs
  - Power units
  - Rotary actuators
  - Sensors

**Pneumatics**
- **Key Markets**
  - Airlift
  - Conveyor & material handling
  - Factory automation
  - Life sciences & medical
  - Machine tools
  - Packaging machinery
  - Transportation & automotive
- **Key Products**
  - Air preparation
  - Brass fittings & valves
  - Manifolds
  - Pneumatic accessories
  - 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
  - Biochemicals & pharmaceuticals
  - Chemical & refining
  - Food & beverage
  - Marine & shipbuilding
  - Medical & dental
  - Nuclear Energy
  - Offshore oil exploration
  - Industrial motors
  - Stepper motors, servo motors, drives & controls
  - Structural extrusions
- **Key Products**
  - Analogical instruments
  - Analytical sample conditioning products & systems
  - Chemical injection fittings & valves
  - Fluid polymer chemical delivery fittings, valves & pumps
  - High purity gas delivery fittings, valves, regulators & digital flow controllers
  - Industrial mass flow meters/ controllers
  - Precision industrial regulators & flow controllers
  - Process control double block & bleed
  - Process control fittings, valves, regulators & manifolds

**Filtration**
- **Key Markets**
  - Aerospace
  - Biomedical processing
  - Consumer
  - Fluid power
  - General industrial
  - Information technology
  - Life sciences
  - Microelectronics
  - Military
  - Oil & gas
  - Power generation
  - Renewables
  - Telecommunications
  - Transportation
- **Key Products**
  - Dynamic seals
  - Electrochemical & pharmaceutical design & assembly
  - EMI/RFI shielding
  - Extruded & precision-fit, fabricated elastomeric seals
  - High-temperature metal seals
  - Homogeneous & inerted elastomeric shapes
  - Medical device fabrication & assembly
  - Metal & plastic retained composite seals
  - Pinch, optical windows
  - Silicone tubing & extrusions
  - Thermal management
  - Vibration dampening

**Sealing & Shielding**
- **Key Markets**
  - Aerospace
  - Chemical processing
  - Consumer
  - Fluid power
  - General industrial
  - Information technology
  - Life sciences
  - Microelectronics
  - Military
  - Oil & gas
  - Power generation
  - Renewables
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- **Key Products**
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