V20, VA/VG20, VA/VG35
Open-Center Control Valves
Mobile Hydraulic Valves
Bulletin HY14-2409/US
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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.

OFFER OF SALE

The items described in this document are hereby offered for sale by Parker-Hannifin Corporation, its subsidiaries or its authorized distributors. This offer and its acceptance are governed by the provisions stated in the detailed "Offer of Sale" elsewhere in this document or available at www.parker.com/hydraulicvalve.

SAFETY GUIDE

For safety information, see Safety Guide SG HY14-1000 at www.parker.com/safety or call 1-800-CParker.
General Valve Assembly Information

The Basics
Every valve has the following elements:
- Inlet
- Main relief
- Work sections
- Outlet
- Section seals
- Stud kit to hold the assembly in place

The valve inlet is connected directly to the outlet coming from the hydraulic pump, and the valve outlet is connected directly to the tank.

The main relief valve is generally installed in the inlet and controls maximum system pressure.

The valve work sections connect the cylinders, motors, spreader valves or other auxiliary valves.

Work Section Types
Sections can be the following types:
- Single Acting (one work port)
- Double Acting (two work ports)

Actuators
Work sections can be actuated by four means:
- Manual Handles
- Electric Solenoids
- Air Actuators
- Hydraulic Pilot

Work Port Relief Valves
Individual work section can have work port relief valves screwed into the sides of the work sections and can control:
- Control pressure
- Reduce cavitation
- Work port relief valves can be adjustable or fixed depending on the style.
V20 Inlets

Specifications

Nominal Flow
Up to 95 LPM (25 GPM)

Operating Pressure
Up to 240 Bar (3500 PSI)

<table>
<thead>
<tr>
<th>Part Number</th>
<th>Model Number</th>
<th>Description</th>
<th>Porting</th>
</tr>
</thead>
<tbody>
<tr>
<td>08650029</td>
<td>20-LC-12</td>
<td>Standard Inlet</td>
<td>SAE 12</td>
</tr>
<tr>
<td>08650004</td>
<td>20-12-SF</td>
<td>Split Flow Mid Inlet</td>
<td>SAE 12</td>
</tr>
<tr>
<td>08650003</td>
<td>20-12-CF</td>
<td>Combined Flow Mid Inlet</td>
<td>SAE 12</td>
</tr>
</tbody>
</table>

V20 Main Relief Valves

<table>
<thead>
<tr>
<th>Part Number</th>
<th>Model Number</th>
<th>Description</th>
<th>Pressure</th>
</tr>
</thead>
<tbody>
<tr>
<td>RP51A-3000</td>
<td>RP51A-3000</td>
<td>Main Relief Valve</td>
<td></td>
</tr>
<tr>
<td>08650419</td>
<td>WH-1950</td>
<td>Fixed Main Relief Valve</td>
<td>134 Bar</td>
</tr>
<tr>
<td>08650420</td>
<td>WH-2550</td>
<td>Fixed Main Relief Valve</td>
<td>176 Bar</td>
</tr>
</tbody>
</table>

[Image of Vocational Truck Valve Program]

[Image of Valves and Truck]
V20 Work Sections

Model V20 double-acting cylinder sections versus V20 motor spools cannot be visually determined simply by looking at the valves. It is important to keep the valves properly marked during the assembly process. It is recommended that a permanent M be marked on the motor spool so the installer will know the difference.

<table>
<thead>
<tr>
<th>Part Number</th>
<th>Model Number</th>
<th>Description</th>
<th>Porting</th>
</tr>
</thead>
<tbody>
<tr>
<td>08650016</td>
<td>20-10-03</td>
<td>Single-Acting Cylinder Spool</td>
<td>SAE 10</td>
</tr>
<tr>
<td>08650020</td>
<td>20-10-04</td>
<td>Double-Acting Cylinder Spool</td>
<td>SAE 10</td>
</tr>
<tr>
<td>08650018</td>
<td>20-10-F4</td>
<td>Double-Acting Motor Spool</td>
<td>SAE 10</td>
</tr>
<tr>
<td>13650963</td>
<td>20-10-03-PA1</td>
<td>Single-Acting Cylinder Spool Pneumatic</td>
<td>SAE 10</td>
</tr>
<tr>
<td>13650964</td>
<td>20-10-04-PA1</td>
<td>Double-Acting Cylinder Spool Pneumatic</td>
<td>SAE 10</td>
</tr>
</tbody>
</table>

V20 Work Port Reliefs

<table>
<thead>
<tr>
<th>Part Number</th>
<th>Model Number</th>
<th>Description</th>
<th>Pressure</th>
</tr>
</thead>
<tbody>
<tr>
<td>08650380</td>
<td>K-20-AC</td>
<td>Anti-Cavitation Check</td>
<td></td>
</tr>
<tr>
<td>08650387</td>
<td>CRA-1200</td>
<td>Combination PR/AC 83 Bar (1200 PSI)</td>
<td></td>
</tr>
<tr>
<td>08650388</td>
<td>CRA-1700</td>
<td>Combination PR/AC 117 Bar (1700 PSI)</td>
<td></td>
</tr>
<tr>
<td>08650389</td>
<td>CRA-1950</td>
<td>Combination PR/AC 134 Bar (1950 PSI)</td>
<td></td>
</tr>
<tr>
<td>08650390</td>
<td>CRA-2500</td>
<td>Combination PR/AC 176 Bar (2550 PSI)</td>
<td></td>
</tr>
</tbody>
</table>
V20 Outlets

The Power Beyond Sleeve must be ordered separately and does not come installed.

<table>
<thead>
<tr>
<th>Part Number</th>
<th>Model Number</th>
<th>Description</th>
<th>Porting</th>
</tr>
</thead>
<tbody>
<tr>
<td>13650146</td>
<td>20-RC-12-E</td>
<td>Standard Outlet</td>
<td>SAE 12</td>
</tr>
<tr>
<td>08650024</td>
<td>20-RC-12-E-MY</td>
<td>Power Beyond Outlet</td>
<td>SAE 12</td>
</tr>
<tr>
<td>08650103</td>
<td>K-20-10-Y</td>
<td>Power Beyond Sleeve</td>
<td>SAE 10</td>
</tr>
<tr>
<td>08650100</td>
<td>K-20-X</td>
<td>Conversion Plug</td>
<td>SAE 12</td>
</tr>
</tbody>
</table>

Action Kits

<table>
<thead>
<tr>
<th>Part Number</th>
<th>Model Number</th>
<th>Description</th>
</tr>
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<tbody>
<tr>
<td>08650105</td>
<td>K-20-D</td>
<td>3-Position Detent</td>
</tr>
<tr>
<td>08650630</td>
<td>K-20-PA1</td>
<td>Pneumatic Positioner</td>
</tr>
</tbody>
</table>

Handles and Accessories

<table>
<thead>
<tr>
<th>Part Number</th>
<th>Model Number</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>08650151</td>
<td>K-20-VH-B</td>
<td>Vertical Handle Black</td>
</tr>
<tr>
<td>08650156</td>
<td>K-20-HH-B</td>
<td>Horizontal Handle Black</td>
</tr>
<tr>
<td>08650107</td>
<td>K-20-RET</td>
<td>Standard Seal Retainer Plate</td>
</tr>
<tr>
<td>08650097</td>
<td>Wiper</td>
<td>Spool Wiper</td>
</tr>
<tr>
<td>08650113</td>
<td>K-20-HBO-C1</td>
<td>Complete Bracket</td>
</tr>
<tr>
<td>08650112</td>
<td>K-20-Boot</td>
<td>Spool Boot Assembly</td>
</tr>
</tbody>
</table>
Vocational Truck Valve Program

Ordering Information

V20 Open-Center Directional Control Valves

Stud Kits

Mid Inlets and Utility Sections count as a work section when selecting stud kits.

<table>
<thead>
<tr>
<th>Part Number</th>
<th>Model Number</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>08650087</td>
<td>K-20-1</td>
<td>1 Work Section</td>
</tr>
<tr>
<td>08650088</td>
<td>K-20-2</td>
<td>2 Work Sections</td>
</tr>
<tr>
<td>08650089</td>
<td>K-20-3</td>
<td>3 Work Sections</td>
</tr>
<tr>
<td>08650090</td>
<td>K-20-4</td>
<td>4 Work Sections</td>
</tr>
<tr>
<td>08650091</td>
<td>K-20-5</td>
<td>5 Work Sections</td>
</tr>
<tr>
<td>08650092</td>
<td>K-20-6</td>
<td>6 Work Sections</td>
</tr>
<tr>
<td>08650093</td>
<td>K-20-7</td>
<td>7 Work Sections</td>
</tr>
<tr>
<td>08650094</td>
<td>K-20-8</td>
<td>8 Work Sections</td>
</tr>
<tr>
<td>08650095</td>
<td>K-20-9</td>
<td>9 Work Sections</td>
</tr>
<tr>
<td>08650096</td>
<td>K-20-10</td>
<td>10 Work Sections</td>
</tr>
</tbody>
</table>

Mid Inlets and Utility Sections count as a work section when selecting stud kits.
VA20 and VG20 Inlets / Main Relief Valves

Specifications

| Nominal Flow | Up to 170 LPM (45 GPM) |
| Operating Pressure | VA20 Up to 172 Bar (2500 PSI) | VG20 Up to 241 Bar (3500 PSI) |

<table>
<thead>
<tr>
<th>Part Number</th>
<th>Model Number</th>
<th>Description</th>
<th>Porting</th>
</tr>
</thead>
<tbody>
<tr>
<td>347-9175-002</td>
<td>DVA20-A880</td>
<td>Inlet</td>
<td>SAE 16 Porting</td>
</tr>
<tr>
<td>347-9174-004</td>
<td>DVA20-CFA70</td>
<td>Combined Flow Mid Inlet</td>
<td>SAE 12 Porting</td>
</tr>
<tr>
<td>347-9174-002</td>
<td>DVA20-SFA70</td>
<td>Split Flow Mid Inlet</td>
<td>SAE 12 Porting</td>
</tr>
<tr>
<td>391-1873-001</td>
<td>DVA20-MRV</td>
<td>Adjustable Main Relief</td>
<td>N/A</td>
</tr>
<tr>
<td>391-1873-002</td>
<td>DV20-MRVP</td>
<td>Main Relief Plug</td>
<td>N/A</td>
</tr>
<tr>
<td>347-9175-010</td>
<td>DVG20-A880</td>
<td>Inlet</td>
<td>SAE 16 Porting</td>
</tr>
<tr>
<td>347-9174-006</td>
<td>DVG20-CFA70</td>
<td>Combined Flow Mid Inlet</td>
<td>SAE 12 Porting</td>
</tr>
<tr>
<td>347-9174-005</td>
<td>DVG20-SFA70</td>
<td>Split Flow Mid Inlet</td>
<td>SAE 12 Porting</td>
</tr>
<tr>
<td>391-1873-128</td>
<td>DVG20-HMRV</td>
<td>Adjustable Main Relief</td>
<td>N/A</td>
</tr>
</tbody>
</table>
VA20 and VG20 Work Sections

Spring Return

<table>
<thead>
<tr>
<th>Part Number</th>
<th>Model Number</th>
<th>Description</th>
<th>Porting</th>
</tr>
</thead>
<tbody>
<tr>
<td>347-9172-003</td>
<td>DVA20-DA7</td>
<td>Low Boy Double-Acting Cylinder Spool</td>
<td>SAE 12</td>
</tr>
<tr>
<td>347-9171-003</td>
<td>DVA20-SA7</td>
<td>Low Boy Single-Acting Cylinder Spool</td>
<td>SAE 12</td>
</tr>
<tr>
<td>347-9172-052</td>
<td>DVG20-DA7</td>
<td>Low Boy Double-Acting Cylinder Spool</td>
<td>SAE 12</td>
</tr>
</tbody>
</table>

* Hi boy port accessories come standard unplugged and must use either a port option or port plug for operation.

Pneumatic

<table>
<thead>
<tr>
<th>Part Number</th>
<th>Model Number</th>
<th>Description</th>
<th>Porting</th>
</tr>
</thead>
<tbody>
<tr>
<td>347-9172-034</td>
<td>DVA20-DV7</td>
<td>Low Boy Double-Acting Cylinder Spool</td>
<td>SAE 12</td>
</tr>
</tbody>
</table>
# VA20 and VG20 Positioner Kits

<table>
<thead>
<tr>
<th>Part Number</th>
<th>Model Number</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>391-1873-206</td>
<td>DV20-K-113</td>
<td>Pneumatic Shifter</td>
</tr>
<tr>
<td>391-1873-020</td>
<td>DV20-K-101</td>
<td>3-Position Detent</td>
</tr>
<tr>
<td>391-1873-019</td>
<td>DV20-K-100</td>
<td>Spring Center</td>
</tr>
</tbody>
</table>

# VA20 and VG20 Stud Kits

<table>
<thead>
<tr>
<th>Part Number</th>
<th>Model Number</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>391-1873-052</td>
<td>DVA20-SK8</td>
<td>8 Work Sections</td>
</tr>
<tr>
<td>391-1873-129</td>
<td>DVG20-TSK1</td>
<td>1 Work Section</td>
</tr>
<tr>
<td>391-1873-130</td>
<td>DVG20-TSK2</td>
<td>2 Work Sections</td>
</tr>
<tr>
<td>391-1873-131</td>
<td>DVG20-TSK3</td>
<td>3 Work Sections</td>
</tr>
<tr>
<td>391-1873-132</td>
<td>DVG20-TSK4</td>
<td>4 Work Sections</td>
</tr>
<tr>
<td>391-1873-133</td>
<td>DVG20-TSK5</td>
<td>5 Work Sections</td>
</tr>
<tr>
<td>391-1873-134</td>
<td>DVG20-TSK6</td>
<td>6 Work Sections</td>
</tr>
<tr>
<td>391-1873-135</td>
<td>DVG20-TSK7</td>
<td>7 Work Sections</td>
</tr>
<tr>
<td>391-1873-136</td>
<td>DVG20-TSK8</td>
<td>8 Work Sections</td>
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</tbody>
</table>

TSK have studs and nuts
VA and VG Work Port Relief

<table>
<thead>
<tr>
<th>Part Number</th>
<th>Model Number</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>391-1873-006</td>
<td>DV-PRVAC</td>
<td>Screw Adjustable Work Port Relief</td>
</tr>
<tr>
<td>391-1873-010</td>
<td>DV-AC</td>
<td>Anti-Cavitation Check Valve</td>
</tr>
<tr>
<td>391-1873-007</td>
<td>DV-PRV-1</td>
<td>Work Port Relief 34 - 69 Bar (500 - 1000 PSI)</td>
</tr>
<tr>
<td>391-1873-008</td>
<td>DV-PRV-2</td>
<td>Work Port Relief 69 - 172 Bar (1000 - 2500 PSI)</td>
</tr>
<tr>
<td>391-1873-009</td>
<td>DV-PRV-3</td>
<td>Work Port Relief 172 - 241 Bar (2500 - 3500 PSI)</td>
</tr>
<tr>
<td>391-1873-011</td>
<td>DV-PRVP</td>
<td>Work Port Relief Plug</td>
</tr>
</tbody>
</table>

*PRV Accessories are shim adjustable.

VA and VG20 Handle Assemblies

<table>
<thead>
<tr>
<th>Part Number</th>
<th>Model Number</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>391-1873-094</td>
<td>DV20-H4</td>
<td>Standard 6&quot; Handle</td>
</tr>
<tr>
<td>391-1873-062</td>
<td>DV20-H8</td>
<td>Standard 8&quot; Handle</td>
</tr>
</tbody>
</table>

VA20 and VG20 Outlets

<table>
<thead>
<tr>
<th>Part Number</th>
<th>Model Number</th>
<th>Description</th>
<th>Porting</th>
</tr>
</thead>
<tbody>
<tr>
<td>347-9176-002</td>
<td>DVA20-TR88</td>
<td>Tank Return</td>
<td>SAE 16</td>
</tr>
<tr>
<td>347-9176-004</td>
<td>DVA20-PB80</td>
<td>Power Beyond End Porting</td>
<td>SAE 16</td>
</tr>
<tr>
<td>347-9176-005</td>
<td>DVA20-PB08</td>
<td>Power Beyond Top Porting</td>
<td>SAE 16</td>
</tr>
<tr>
<td>347-9176-007</td>
<td>DVG20-TTR88</td>
<td>Tank Return</td>
<td>SAE 16</td>
</tr>
<tr>
<td>347-9176-008</td>
<td>DVG20-TTB80</td>
<td>Power Beyond Porting</td>
<td>SAE 16</td>
</tr>
</tbody>
</table>
VA35 and VG35 Inlets and Main Relief Valve

Specifications
Nominal Flow
Up to 246 LPM (65 GPM)

Operating Pressure
VA35 Up to 172 Bar (2500 PSI)
VG35 Up to 241 Bar (3500 PSI)

<table>
<thead>
<tr>
<th>Part Number</th>
<th>Model Number</th>
<th>Description</th>
<th>Porting</th>
</tr>
</thead>
<tbody>
<tr>
<td>348-9175-005</td>
<td>DVA35-A880</td>
<td>Inlet</td>
<td>SAE 16 Porting</td>
</tr>
<tr>
<td>348-9174-004</td>
<td>DVA35-CFA80</td>
<td>Combined Flow Mid Inlet</td>
<td>SAE 16 Porting</td>
</tr>
<tr>
<td>348-9174-002</td>
<td>DVA35-SFA80</td>
<td>Split Flow Mid Inlet</td>
<td>SAE 16 Porting</td>
</tr>
<tr>
<td>391-1873-003</td>
<td>DVA35-MRV-1</td>
<td>Main Relief 55 - 138 Bar (800 - 2000 PSI)</td>
<td>N/A</td>
</tr>
<tr>
<td>391-1873-004</td>
<td>DVA35-MRV-2</td>
<td>Main Relief 138 - 172 Bar (2000 - 2500 PSI)</td>
<td>N/A</td>
</tr>
<tr>
<td>348-9175-008</td>
<td>DVG35-A880</td>
<td>Inlet</td>
<td>SAE 16 Porting</td>
</tr>
<tr>
<td>348-9174-006</td>
<td>DVG35-CFA80</td>
<td>Combined Flow Mid Inlet</td>
<td>SAE 16 Porting</td>
</tr>
<tr>
<td>348-9174-005</td>
<td>DVG35-SFA80</td>
<td>Split Flow Mid Inlet</td>
<td>SAE 16 Porting</td>
</tr>
<tr>
<td>391-1873-137</td>
<td>DVG35-HMRV</td>
<td>Main Relief 193 - 241 Bar (2800 - 3500 PSI)</td>
<td>N/A</td>
</tr>
</tbody>
</table>

VA35 and VG35 Work Sections

Spring Return

<table>
<thead>
<tr>
<th>Part Number</th>
<th>Model Number</th>
<th>Description</th>
<th>Porting</th>
</tr>
</thead>
<tbody>
<tr>
<td>348-9172-003</td>
<td>DVA35-DA8</td>
<td>Low Boy Double-Acting Cylinder Spool</td>
<td>SAE 16</td>
</tr>
<tr>
<td>348-9172-006</td>
<td>DVA35-MA8</td>
<td>Low Boy Double-Acting Motor Spool</td>
<td>SAE 16</td>
</tr>
<tr>
<td>348-9171-003</td>
<td>DVA35-SA8</td>
<td>Low Boy Single-Acting Cylinder Spool</td>
<td>SAE 16</td>
</tr>
<tr>
<td>348-9172-009</td>
<td>DVA35-HA855</td>
<td>High Boy Double-Acting Cylinder Spool</td>
<td>SAE 16</td>
</tr>
<tr>
<td>348-9172-012</td>
<td>DVA35-LA855</td>
<td>High Boy Double-Acting Motor Spool</td>
<td>SAE 16</td>
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</table>
VA35 and VG35 Work Sections Continued

Spring Return

<table>
<thead>
<tr>
<th>Part Number</th>
<th>Model Number</th>
<th>Description</th>
<th>Porting</th>
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</thead>
<tbody>
<tr>
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Pneumatic

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* Hi boy port accessories come standard unplugged and must use either a port option or port plug for operation.

VA35 and VG35 Handle Assemblies

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VA35 and VG35 Outlets

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VA35 and VG35 Positioner Kits

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<td>DV35-K-200</td>
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# Vocational Truck Valve Program

## Ordering Information

### VA35 and VG35 Stud Kits

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TSK have studs and nuts

### Plugs

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Offer of Sale

The terms and conditions of this offer are subject to the provisions contained in Buyer's order of Sale or any newer version of the same, published by Seller electronically at www.parker.com/saleterms/. Seller objects to any contrary or additional terms or conditions of Buyer's order of sale or any document or other communication issued by Buyer. Buyer's order for any item described in this offer, when communicated to Seller verbally, or in writing, shall constitute acceptance of this offer. All offers or work described will be referred to as “Products.”

1. Terms and Conditions. Seller’s willingness to offer Products for sale or accept an order for them is subject to the terms and conditions contained herein and in the offer of Sale or any newer version of the same, published by Seller electronically at www.parker.com/saleterms/. Seller objects to any contrary or additional terms or conditions of Buyer’s order of sale or any document or other communication issued by Buyer. Buyer’s order for any item described in this offer, when communicated to Seller verbally, or in writing, shall constitute acceptance of this offer. All offers or work described will be referred to as “Products.”

2. Price; Payment. Prices stated on Seller’s Quote are valid for thirty (30) days, except as explicitly otherwise stated therein, and do not include any sales, use, or other taxes levied or imposed on the sale of Products, or on the manufacturing, processing, or handling of any kind, nature, or description, of the Products at any place, whether within or without Seller’s facilities or in transit. Buyer reserves the right to adjust the prices to adjust for any raw material price fluctuations. Unless otherwise specified by Seller, all prices are F.C.A. Seller’s facility (INCONTEMS 10). Payment is subject to credit approval and payment for all purchases is due thirty (30) days from the date of invoice (or such date as may be specified by Seller’s Credit Department). Unpaid invoices beyond the specified payment date incur interest at the rate of 1.5% per month, or the highest rate allowed under applicable law.

3. Shipment; Delivery; Title and Risk of Loss. All delivery dates are approximate.

(i) Seller is not responsible for damages resulting from any delay. Regardless of the manner of shipment, delivery occurs and title and risk of loss or damage pass to Buyer, upon placement of the Products with the shipment carrier at Seller’s facility. Unless otherwise stated, Seller may exercise its judgment in choosing the carrier and means of delivery. No detriment of shipment at Buyer’s request beyond the respective dates indicated will be made except on terms that will indemnify Seller harmless against all loss and additional expense. Buyer shall be responsible for any additional shipping charges incurred by Seller due to Buyer’s acts or omissions.

(ii) Seller reserves the right to make any changes in the specifications and designs of any Product, in Buyer’s order or any other document or other communication issued by Buyer, or directed to Products delivered hereunder for which Seller is not liable for claims of infringement based on defects in material or workmanship for a period of eighteen (18) months from the date of delivery. All prices are based upon the exclusive limited warranty stated above, and upon the conditions stated herein. DISCLAимер; DISCLAIMER OF WARRANTY: THIS WARRANTY IS THE SOLE AND ENTIRE WARRANTY PERTAINING TO PRODUCTS PROVIDED. SELLER DISCLAIMS ALL OTHER WARRANTIES, EXPRESS AND IMPLIED, INCLUDING DESIGN, MERCHANTABILITY AND FITNESS FOR A PARTICULAR PURPOSE.

5. Claims; Commencement of Actions. Buyer shall promptly inspect all Products upon receipt, and all claims for shortages will be made within ten (10) days of delivery. No other claims against Seller will be allowed unless asserted in writing within thirty (30) days after delivery. Buyer shall notify Seller of any nonconforming or damaged Products within thirty (30) days after the date of delivery. Claims should have been discovered by Buyer. Any claim or action against Seller based upon breach of contract or any other theory, including tort, negligence, or otherwise, must be commenced within twelve (12) months from the date of the alleged breach or other alleged event, without regard to the date of discovery.

6. LIMITATION OF LIABILITY. IN THE EVENT OF A BREACH OF WARRANTY, SELLER’S LIABILITY FOR DAMAGES, REPAIR OR REPLACEMENT OF DEFECTIVE PRODUCT, OR REFUND THE PURCHASE PRICE WITHIN A REASONABLE PERIOD OF TIME, IN NO EVENT IS SELLER LIABLE FOR ANY SPECIAL, INDIRECT, INCIDENTAL OR CONSEQUENTIAL DAMAGES ARISING OUT OF, OR AS THE RESULT OF, THE SALE, DELIVERY, NON-DELIVERY, SERVICING, USE OR LOSS OF USE OF THE PRODUCTS OR ANY PART THEREOF, OR FOR ANY CHARGES OR EXPENSES OF ANY NATURE INCURRED WITHOUT SELLER’S WRITTEN CONSENT. SELLER’S ENTIRE LIABILITY UNDER THIS AGREEMENT IS LIMITED TO THE PURCHASE PRICE OF THE PRODUCTS.

7. The user, through design, analysis, and testing, is solely responsible for making the final selection of the system and Product and assuring that all performance, endurance, maintenance, safety and warning requirements of the applicable standards, codes, and regulations are met. Buyer must analyze and test all applicable industry standards and Product information. If Seller provides Products 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 Products or systems.

8. Loss to Buyer’s Property. Any designs, tools, patterns, materials, drawings, confidential information or equipment furnished by or to any other items which become Buyer’s property, will be considered obsolete and may be destroyed by Seller after two (2) consecutive years have elapsed without Buyer ordering the items manufactured using such property. Seller shall not be responsible for any loss of损坏 to such property while it is in Seller’s possession or control.

9. Special Tooling. A tooling charge may be imposed for any special tooling, including tooling charges, fixtures, molds and patterns, acquired to manufacture Products. Such special tooling shall be and shall remain Seller’s property notwithstanding payment of any charges by Buyer. In no event will Buyer acquire any interest in apparatus which is utilized in the manufacture of Products, or on the manufacturing, processing, or handling of any kind, nature, or description, of the Products at any place, whether within or without Seller’s facilities, and shall remain Seller’s property notwithstanding any payment made by Buyer. Unless otherwise agreed, Seller has the right to destroy, recondition or dispose of any special tooling or other property in its sole discretion at any time.

10. Buyer’s Obligation; Rights of Seller. To secure payment of all sums due or otherwise, Seller places a security interest in all Products delivered to Buyer and this agreement is deemed a Security Agreement governed by the Uniform Commercial Code. Buyer authorizes Seller as its attorney to execute and file on Buyer’s behalf all documents Seller deems necessary to perfect its security interest.

11. Seller shall not be liable for any losses, claims, liabilities, damages, lawsuits, judgments and costs (including attorney fees and defense costs), whether for personal injury, property damage, patent, trademark or copyright infringement or any other claim, brought by or incurred by Buyer, Buyer’s employees, or any other person, arising out of: (a) any action, in whole or in part, arising out of or related to the Products purchased by Buyer from Seller; (b) any act or omission, negligent or otherwise, of Buyer; (c) Seller’s use of patterns, plans, drawings, or specifications furnished by Buyer; or (d) Buyer’s failure to follow Seller’s written instructions as to terms and conditions. Seller shall not indemnify Buyer under any circumstance except as otherwise provided.

12. Limitations and Changes. Buyer may not cancel or modify or cancel any order for any reason, except with Seller’s written consent and upon terms that will indemnify, defend and hold Seller harmless against all direct, incidental and consequential loss or damage. Buyer may change Product features, specifications, designs and availability.

13. Limitation on Assignment. Buyer may not assign its rights or obligations under this agreement without the prior written consent of Seller.

14. Force Majeure. Seller does not assume the risk and is not liable for delay or failure to perform any of Seller’s obligations by reason of events or circumstances beyond its reasonable control (hereinafter “Events of Force Majeure”). Events of Force Majeure shall include without limitation; accidents, strikes or labor disputes, governmental action or inaction, war, acts of God, and acts or limitations of carriers, and shall cease and be terminated by the date, time, and place of occurrence of such event. Buyer shall be responsible for determining that such data and specifications are suitable and sufficient for all applications and reasonably foreseeable uses of the Products or systems.

15. Governing Law. This agreement, the sale and delivery of all Products are deemed to have taken place in, shall be governed and construed in accordance with, the laws of the State of Ohio, as applicable to contracts executed and wholly performed therein without regard to principles of conflict of laws. Seller agrees and consents to the exclusive jurisdiction and venue of the courts of Cuyahoga County, Ohio with respect to any dispute, controversy or claim arising out of or relating to this agreement.

16. Indemnity for Infringement of Intellectual Property Rights. Seller is not liable for infringement of any patents, trademarks, copyrights, trade dress, trade secrets or similar rights except as provided in this Section. Seller will defend and indemnify Buyer against allegations of infringement of U.S. patents, U.S. trademarks, copyrights, trade dress and trade secrets (“Intellectual Property Rights”). Seller will defend at its own expense and will pay the cost of any settlement or damages awarded in an action brought against Buyer based on a claim that a Product sold pursuant to this agreement infringes the Intellectual Property Rights of a third party. Seller’s obligation to indemnify and defend Buyer is contingent on Buyer notifying Seller within ten (10) days after Buyer becomes aware of such allegations of infringement. Seller, and Seller holding sole control over the defense of any allegations or actions including all negotiations for settlement or compromise. If a Product is subject to a claim that a Product infringes a US patent or trademark, Seller must refund a reasonable allowance for depreciation. This agreement infringes the Intellectual Property Rights of a third party. Seller’s obligation to indemnify and defend Buyer is contingent on Buyer notifying Seller within ten (10) days after Buyer becomes aware of such allegations of infringement, and Seller having sole control over the defense of any allegations or actions including all negotiations for settlement or compromise. If a Product is subject to a claim that a Product infringes a US patent or trademark, Seller must refund a reasonable allowance for depreciation. Notwithstanding the foregoing, Seller is not liable for claims of infringement based on information provided by Buyer, or directed to Products delivered hereunder for which the designs are specified in whole or part by Buyer, or infringements resulting from the modification, combination or use in a system of any Product sold hereunder. The foregoing provisions of this Section constitute Seller’s sole and exclusive liability and Buyer’s sole and exclusive remedy for infringement of Intellectual Property Rights.

17. Entire Agreement. This agreement contains the entire agreement between the Buyer and Seller and constitutes the final, complete and exclusive expression of the terms of sale. All prior or contemporaneous written or oral agreements or negotiations with respect to the subject matter are hereby merged. The terms contained herein may not be modified unless in writing and signed by an authorized representative of Parker Hannifin Corporation.

20. Compliance with Laws. Buyer agrees to comply with all applicable laws, regulations, and industry and professional standards of care, including those of the United States government and the country or countries in which Buyer’s use of the Products will be permitted, including without limitation the U.K. Bribery Act, the U.S. Foreign Corrupt Practices Act (“FCPA”), the U.S. Anti-Kickback Act (“Anti-Kickback Act”) and the U.S. Food and Drug Administration’s (“FDA”) regulations and rules. Seller agrees and certifies that Buyer will adhere to the requirements thereof. Buyer agrees and certifies that Buyer will adhere to the requirements thereof. In particular, Buyer represents and agrees that Buyer will not make any payment or give any gift, item of value, directly or indirectly, to any foreign government official, foreign political party or official thereof, any candidate for foreign political office, or any commercial entity or person, for the purpose of influencing such person to purchase Products or otherwise benefit the business of Seller.
Parker Safety Guide for Selecting and Using Hydraulic Valves and Related Accessories

**WARNING:** Failure or improper selection or improper use of Parker Hydraulic Valve Division (HVD) Valves or related accessories (“Products”) can cause death, personal injury and property damage. Possible consequences of failure or improper use of these Products include but are not limited to:

- Valves or parts thereof thrown off at high speed
- High velocity fluid discharge
- Explosion or burning of the conveyed fluid
- Contact with suddenly moving or falling objects controlled by the Valve
- Injections by high-pressure fluid discharge

Before selecting or using any of these Products, it is important that you read and follow the instructions below. In general, the Products are not approved for in-flight aerospace applications. Consult the factory for the few that are FAA approved.

### 1.0 GENERAL INSTRUCTIONS

#### 1.1 Scope:
This safety guide provides instructions for selecting and using (including assembling, installing and maintaining) these Products. For convenience all items in this guide are called “Valves”. This safety guide is a supplement to and is to be used in conjunction with the specific Parker catalogs for the specific Valves and/or accessories being considered for use. See item 1.6 below for obtaining those catalogs.

#### 1.2 Fail-Safe:
Valves can and do fail without warning for many reasons. Design all systems and equipment in a fail-safe mode, so that failure of the Valve or Valve Assembly will not endanger persons or property.

#### 1.3 Safety Devices:
Never disconnect, override, circumvent or otherwise disable any safety lockout on any system whether powered by HVD Valves or any motion control system of any manufacturer. (e.g. Automatic shut-off on a riding lawn mower should the operator get out of the seat).

#### 1.4 Literature:
Provide a copy of this safety guide to each person that is responsible for selecting or using HVD Valve Products. Do not select HVD Valves without thoroughly reading and understanding this safety guide as well as the specific Parker catalogs for the products considered or selected.

#### 1.5 User Responsibility:
Due the wide variety of operating conditions and applications for Valves, HVD and its distributors do not represent or warrant that any particular Valve is suitable for any specific system. This safety guide does not analyze all technical parameters that must be considered in selecting a product. The user, through its own analysis and testing is solely responsible:

- Making the final selection of the Valve
- Assuring that the user’s requirements are met and that the application presents no health or safety hazards.
- Providing all appropriate health and safety warnings on the equipment on which the Valves are used.
- Assuring compliance with all applicable health and safety laws and regulations.

#### 1.6 Additional Questions:
Call the appropriate Parker technical service department if you have any questions or require any additional information. See the Parker publication for the product being considered or used, or call 1-800-CPARKER, or go to www.parker.com for the telephone numbers of the appropriate technical service department. For additional copies of this or any other Parker Safety Guide go to www.parker.com and click on the safety button on the opening page. Catalogs and/or catalog numbers for the various HVD Valve Products can be obtained by calling HVD at 440-366-5100. Phone numbers and catalog information is also available on the Parker website, www.parker.com.

### 2.0 VALVE SELECTION INSTRUCTIONS

#### 2.1 Pressure:
Valve selection must be made so that the maximum working pressure of the Valve is equal to or greater than the maximum system pressure. Surge, impulse or peak transient pressures in the system must be below the maximum working pressure of the Valve. Surge, impulse and peak pressures can usually be determined by sensitive electrical instrumentation that measures and indicates pressures at millisecond intervals. Mechanical pressure gauges indicate only average pressure and cannot be used to determine surge, impulse or peak transient pressures. Burst pressure ratings if given or known are for manufacturing purposes only and are not an indication that the Product can be used in applications at the burst pressure or otherwise above the maximum working pressure.

#### 2.2 Temperature:
The fluid temperature must be regulated or controlled so that the operating viscosity of the fluid is maintained at a level specified for the particular Valve product. Such ranges are given in the product catalogs or can be obtained from the proper customer service department for the particular Valve product.

#### 2.3 Fluid Compatibility:
The fluid conveyed in Valves has direct implications on the Valve selection. The fluid must be chemically compatible with the Valve component materials. Elastomer seals, brass, cast iron, aluminum for example all are potentially affected by certain fluids. Additionally, fluid selection affects the performance of various Valves. Considerations relative to fluid selection are outlined in the specific HVD Valve product catalog. Of particular importance is that the fluid be for hydraulic use, contain the proper additives and wear inhibitors. See 1.6 “Additional Questions” above for information to obtain such HVD catalogs.

#### 2.4 Changing Fluids:
If a system requires a different fluid, it should be done with the guidance in number 2.3 above. Additionally, it may be necessary to flush the system (including the Valves) to remove any of the previous fluid. Consult the Parker Valve Division for guidance.

#### 2.5 Size:
Transmission of power by means of pressurized fluid varies with pressure and rate of flow. The size of the components must be adequate to keep pressure losses to a minimum and avoid damage due to heat generation or excessive fluid velocity.

#### 2.6 Placement:
Installation of Valves must take into account the orientation of the Valve and the proximity of the Valve to other parts of the system. This includes but is not limited to closeness to hot and cold areas, access for servicing and operation as well as orientation for proper connectors.

#### 2.7 Ports:
Connection of Valves in systems can be by threaded ports, sub-base surfaces, flanges and manifolds. In all cases, the proper fitting, surface or mounting hardware must be selected to properly seal and contain the system fluid so as to avoid the adverse conditions listed in the initial warning box above. Specifically, if using threaded ports, the designer must make sure that the mating fitting is of the compatible thread. Also, the instructions provided by the connector hardware supplier must be read and understood so as to properly assemble the connector. The Parker Safety Guide for using Hose, Tubing and Fittings and Related Accessories is but one reference to this end.

#### 2.8 Environment:
Care must be taken to insure that the Valve and Valve Assemblies are either compatible with or protected from the environment (that is, surrounding conditions) to which they are exposed. Environmental conditions including but not limited to ultraviolet radiation, sunlight, heat, ozone, moisture, water, salt water, chemicals and air pollutants can cause degradation and premature failure.

#### 2.9 Electric Power:
For Valves requiring electric power for control, it is imperative that the electricity be delivered at the proper voltage, current and wattage requirements. To obtain the proper control requirements please refer to the respective Parker product catalog for the specific Valve that is intended for use. If further guidance is required, call the appropriate technical service department identified in the respective Parker product catalog.

#### 2.10 Specifications and Standards:
When selecting Valves, government, industry and Parker specifications and recommendations must be reviewed and followed as applicable.

#### 2.11 Accessories:
All accessories used in conjunction with any Parker Valve product must be rated to the same requirements of the Valve including but not limited to pressure, flow, material compatibility, power requirements. All of these items must be examined as stated in the “VALVE INSTALLATION INSTRUCTIONS” paragraph 3.0.

(continued on next page)
3.0 VALVE INSTALLATION INSTRUCTIONS

3.1 Component Inspection: Prior to a careful examination of the Valve(s) must be performed. The Valve intended for use must be checked for correct style, size, mounting and external condition. The Valve must be examined for cleanliness, absence of external defects or gouges, cracked or otherwise deformed parts or missing items. The mounting surface or port connections must be protected and free of burrs, scratches, corrosion or other imperfections. DO NOT use any item that displays any signs of nonconformance. In addition, any accessory including but not limited to fittings, bolt kits, hoses, sub bases, manifolds, and electrical connectors must be subjected to the same examination.

3.2 Handling Valves: Many Valves whether HVD Valves or of another manufacturer can be large, bulky or otherwise difficult to handle. Care must be taken to use proper lifting techniques, tools, braces, lifting belts or other aids so as not to cause injury to the user, any other person or to property.

3.3 Filtration: Fluid cleanliness is a necessity in any hydraulic system. Fluid filters must be installed and maintained in the system to provide the required level of fluid cleanliness. Filters can be placed in the inlets, pressure lines and return lines. The level of cleanliness required is specified in the HVD product catalog for the specific Valve(s) selected or intended for use. For additional information on Filter selection contact Parker Filter Division at 800-253-1258 or 419-644-4311.

3.4 Servo Valves: Application of Servo Valves in general requires knowledge and awareness of “closed loop control theory” and the use of electronic controls for successful and safe operation. Individuals who do not have such experience or knowledge of gain training before use of such products. Parker offers both classroom training as well as manuals to assist in gaining this knowledge. These aids can be obtained by contacting Hydraulic Valve Division at 440-366-5100, calling the general Parker help line 800-CPARKER or going to the Parker web site at www.parker.com.

3.5 Accessory Ratings: All accessories used in combination with the selected or intended Valve product must be rated and compatible with the selected Valve. Specifically, the items must be of equal or greater rating including but not limited to pressure, fluid, flow, power, size, port style, thread connectors and material.

3.6 Connection Styles: It is the responsibility of the user of the Parker product to properly select connector and accessories that match the connections on the sub plate, Valve, flange or threaded connection or manifold. It is also the responsibility of the installer to possess adequate skill and knowledge including but not limited to threaded preparation, torque technique, hose assembly and inspection, tube preparation and assembly, and fitting installation. Parker Tube Fitting Division (www.parker.com) catalog 4300 and Parker Hose Products (www.parkerhose.com) catalog 4400 describe some basic technical information relative to proper fitting assembly.

3.7 Electrical Connections: All electrical connections must be made to the applicable codes and local safety requirements.

3.8 Gauges and Sensors: The user must install sufficient gauges and sensors in the system so as to be able to determine the condition of the system. This includes but is not limited to pressure gauges, flow meters, temperature sensors and site gauges. These are of utmost importance should removal or disassembly of a Valve, portion of a Valve or portion of the system become necessary. Refer to “VALVE MAINTENANCE AND REPLACEMENT INSTRUCTIONS” for details and especially item 4.8.

3.9 System Checkout: Once installed the Valve installation must be tested to insure proper operation and that no external leakage exists. All safety equipment must be in place including but not limited to safety glasses, helmets, ear protection, splash guards, gloves, coveralls and any shields on the equipment. All air entrapment must be eliminated and the system pressurized to the maximum system pressure (at or below the Valve maximum working pressure) and checked for proper function and freedom from leaks. Personnel must stay out of potentially hazardous areas while testing and using.

4.0 VALVE MAINTENANCE AND REPLACEMENT INSTRUCTIONS

4.1 Maintenance Program: Even with proper installation, Valves and Valve System life may be significantly reduced without a continuing maintenance program. The severity of the application and risk potential must determine the frequency of the inspection and the replacement of the products so that Products are replaced before any failure occurs. A maintenance program must be established and followed by the user, and at a minimum, must include instructions 4.2 through 4.10. An FMEA (Failure Mode and Effects Analysis) is recommended in determining maintenance requirements.

4.2 Visual Inspection-Valves: Any of the following conditions require immediate shut down and replacement of the Valve.

- Evidence that the Valve is in partial dis-assemble.
- Visible crack or suspicion of a crack in the Valve housing or bent, cracked or otherwise damaged solenoid.
- Missing or partially extending drive pin on a flow control knob.
- Missing, loose components, obstructions or other condition impeding the motion or function of the manual knob, lever, foot pedal or other mechanical operator of a hydraulic Valve.
- Any evidence of burning or heat induced discoloration.
- Blistered, soft, degraded or loose cover of any kind.
- Loose wire or electrical connector.

4.3 Visual Inspection-Other: The following conditions must be tightened, repaired, corrected or replaced as required.

1. Fluid on the ground must be cleaned immediately. Also, the source of the fluid must be determined prior to running the equipment again.
2. Leaking port or excessive external dirt build-up.
3. System fluid level is too low or air is entrapped or visible in the reservoir.
4. Equipment controlled by the Valve or Valve assembly has been losing power, speed, efficiency

4.4 Filter Maintenance: System filters must be maintained and kept in proper working order. The main service requirement is periodic replacement of the filter element or screen. Contact Parker Filter Division at 800-253-1258 or 419-644-4311 for further filter maintenance details.

4.5 Functional Test: See “System Checkout” number 3.9 above in “VALVE INSTALLATION INSTRUCTIONS”.

4.6 Replacement Intervals: Valves and Valve Systems will eventually age and require replacement. Seals especially should be inspected and replaced at specific replacement intervals based on previous experience, government or industry recommendations, or when failures could result in unacceptable downtime, damage or injury risk. At a minimum seals must be replaced whenever service is rendered to a Valve product.

4.7 Adjustments, Control Knobs, and Other Manual Controls: System Pressure and Flow are typically adjusted by knobs and/or handles. A set-screw or lock-nut secures the adjustment device so as to maintain the desired setting. This set-screw or lock-nut must first be loosened prior to making any adjustments and re-tightened after adjustment on the HVD Valve. All valves must be made in conjunction with pressure gauges and/or flow meters (or by watching the speed of the actuator in the case of setting flow only). See paragraph “Gauges and Sensors” above in the section “VALVE INSTALLATION INSTRUCTIONS”. Under no circumstances should any control knob, adjustment stem, handle, foot pedal or other actuating device be forced beyond the mechanical stop(s) on the Valve. For example: No “knocking” the Valve housing or external condition and mechanical strength of the Valve may be exceeded.

4.8 High pressure Warning: Hydraulic power is transmitted by high-pressure fluids through hoses, fittings and valves, pumps and actuators. This condition can be dangerous and potentially lethal and, therefore, extreme caution must be exercised when working with fluids under pressure. From time to time, hoses, Valves, tubes or fittings fail if they are not replaced at proper intervals. These failures are the result of some form of misapplication, abuse, wear, or failure to perform proper maintenance. When such failure occurs, generally the high pressure fluid inside escapes in a stream which may or may not be visible to the user. In such instances the user should attempt to locate the leak by “feeling” with their hands or the other part of their body. High-pressure fluids can and will penetrate the skin and cause severe tissue damage and possible loss of limb or life. Even seemingly minor hydraulic fluid injection injuries must be treated immediately by a physician with knowledge of the tissue damaging properties of hydraulic fluid.

If a hose, tube, fitting or Valve failure occurs, immediately shut down the equipment and leave the area until pressure has been completely released from the system. Simply shutting down the pump may or may not eliminate the pressure in the system. It may take several minutes or even hours for the pressure to be reduced. The area of any possible leak area can be examined safely. Once the pressure has been reduced safely. Once the pressure has been reduced safely, the suspected leaking item can be taken off the equipment and examined. It must always be replaced if a failure has occurred. Never attempt to patch or repair a connector (especially a hose) or Valve that has failed. Consult the nearest Parker distributor or the appropriate Parker division for component replacement information. Never touch or examine a failed hydraulic component unless it is obvious that the item no longer contains fluid under pressure.

• Functional Test: See “System Checkout” number 3.9 above in “VALVE INSTALLATION INSTRUCTIONS”.

• Replacement Intervals: Valves and Valve Systems will eventually age and require replacement. Seals especially should be inspected and replaced at specific replacement intervals based on previous experience, government or industry recommendations, or when failures could result in unacceptable downtime, damage or injury risk. At a minimum seals must be replaced whenever service is rendered to a Valve product.

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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 1 800 C-Parker (1 800 272 7537)

**Fluid & Gas Handling**

**Key Markets**  
Aeromotor services  
Commercial transports  
Engines  
General & business aviation  
Helicopters  
Launch vehicles  
Military aircraft  
Missiles  
Power generation  
Regional transports  
Unmanned aerial vehicles  

**Key Products**  
Control systems & actuation products  
Engine systems & components  
Fluid conveyance systems & components  
Fuel systems & components  
Fuel tank insert assemblies  
Hydraulic systems & components  
Thermal management  
Wheels & brakes  

**Hydraulics**

**Key Markets**  
Aerial lift  
Agriculture  
Aircraft subsystems  
Construction machinery  
Food & beverage  
Fuel & gas delivery  
Industrial machinery  
Life sciences  
Marine  
Mining  
Mobile  
Oil & gas  
Renewable energy  
Transportation  

**Key Products**  
Check valves  
Connections for low pressure  
Fluid conveyance  
Deep sea umbilicals  
Diagnostic equipment  
Hose couplings  
Industrial hose  
Meaning systems & power cables  
PITF hose & tubing  
Quick couplings  
Rubber & thermoplastic hose  
Tube fittings & adapters  
Tubing & plastic fittings  

**Pneumatics**

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

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

**Electromechanical**

**Key Markets**  
Aerospace  
Factory automation  
Life science & medical  
Machine tools  
Packaging machinery  
Paper machinery  
Plastics machinery & converting  
Primary metals  
Semiconductors & electronics  
Textile  
Wire & cable  

**Key Products**  
AC/DC drives & systems  
Electric actuators, gantry robots & slides  
Electrophysiological actuation systems  
Electromechanical actuation systems  
Human machine interfaces  
Linear motors  
Stepper motors, servo motors, drives & controls  
Structural extinctions  

**Aerospace**

**Key Markets**  
Aircraft  
Air conditioning  
Construction Machinery  
Food & beverage  
Industrial machinery  
Life sciences  
Oil & gas  
Precision cooling  
Process  
Refrigeration  
Transportation  

**Key Products**  
Accumulators  
Advanced actuators  
OIL, controls  
Electronic controllers  
Filter drawers  
Hand shut-off valves  
Heat exchangers  
Hose & fittings  
Pressure regulating valves  
Refrigerant distributors  
Safety relief valves  
Smart pumps  
Solenoid valves  
Thermostatic expansion valves  

**Process Control**

**Key Markets**  
Alternative fuels  
Biopharmaceuticals  
Chemical & refining  
Food & beverage  
General & dental  
Industrial mass flow meters/controls  
Medical & dental  
Microfiltration  
Sensors  

**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 extinctions  
Thermostatic tubing & fittings  
Vacuum generators, cups & sensors  

**Process Control**

**Key Markets**  
Aerospace  
Chemical processing  
Consumer  
Fluid power  
General industrial  
Information technology  
Life sciences  
Microelectronics  
Military  
Oil & gas  
Renewable energy  
Telecommunications  
Transportation  

**Key Products**  
Analytical Instruments  
Analytical sample conditioning products & systems  
Chemical injection fittings & valves  
Fluoropolymer chemical delivery  
Fittings, valves & pumps  
High purity gas delivery fittings, valves, regulators & digital flow controllers  
Industrial mass flow meters/controls  
Permanant no-weld tube fittings  
Precision industrial regulators & flow controllers  
Process control double block & bleed valves  
Process control fittings, valves, regulators & manifold valves  

**Sealing & Shielding**

**Key Markets**  
Aerospace  
Chemical processing  
Consumer  
Fluid power  
General industrial  
Information technology  
Life sciences  
Microelectronics  
Military  
Oil & gas  
Renewable energy  
Telecommunications  
Transportation  

**Key Products**  
Dynamatic seals  
Elastomeric o-rings  
Electro-medical instrument design & assembly  
EMI shielding  
Exhausted & precision cut, fabricated elastomeric seals  
High temperature metal seals  
Homogeneous & inserted elastomeric shapes  
Medical device fabrication & assembly  
Metal & plastic retained compression seals  
Shielded optical windows  
Silicone tubing & connectors  
Thermal management  
Vibration damping  

**Climate Control**

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

**Key Products**  
Accumulators  
Advanced actuators  
OIL, controls  
Electronic controllers  
Filter drawers  
Hand shut-off valves  
Heat exchangers  
Hose & fittings  
Pressure regulating valves  
Refrigerant distributors  
Safety relief valves  
Smart pumps  
Soltenoid valves  
Thermostatic expansion valves  

**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 & dryers  
Engine air, coolant, lube & oil filtration systems  
Fluid condition monitoring systems  
Hydraulic & lubrication filters  
Hydrogen, nitrogen & zero air generators  
Instrumentation filters  
Membrane & ion filters  
Microfiltration  
Sieve air filtration  
Water desalination & purification filters & systems  

**Fluid Conveyance**

**Key Markets**  
Aerospace  
Chemical processing  
Consumer  
Fluid power  
General industrial  
Information technology  
Life sciences  
Microelectronics  
Military  
Oil & gas  
Renewable energy  
Telecommunications  
Transportation  

**Key Products**  
Dynamatic seals  
Elastomeric o-rings  
Electro-medical instrument design & assembly  
EMI shielding  
Exhausted & precision cut, fabricated elastomeric seals  
High temperature metal seals  
Homogeneous & inserted elastomeric shapes  
Medical device fabrication & assembly  
Metal & plastic retained compression seals  
Shielded optical windows  
Silicone tubing & connectors  
Thermal management  
Vibration damping  

**Sealing & Shielding**

**Key Markets**  
Aerospace  
Chemical processing  
Consumer  
Fluid power  
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Life sciences  
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Military  
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**Filtration**

**Key Markets**  
Aerospace  
Food & beverage  
Industrial plant & equipment  
Life sciences  
Marine  
Mobile equipment  
Oil & gas  
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Process  
Transportation  
Water Purification  

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Engine air, coolant, lube & oil filtration systems  
Fluid condition monitoring systems  
Hydraulic & lubrication filters  
Hydrogen, nitrogen & zero air generators  
Instrumentation filters  
Membrane & ion filters  
Microfiltration  
Sieve air filtration  
Water desalination & purification filters & systems  

**Parker’s Motion & Control Technologies**

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# Parker Hydraulics International Sales Offices

## North America

**Hydraulics Group Headquarters**  
6035 Parkland Boulevard  
Cleveland, OH 44124-4141 USA  
Tel: 216-896-3000  
Fax: 216-896-4031

**Parker Canada Division**  
160 Chisholm Drive  
Milton, Ontario, L9T 3G9 Canada  
Tel: 905-693-3000  
Fax: 905-876-1958

**Parker Hannifin de México**  
Industrial Hydraulic Sales  
Eje Uno Norte No. 100  
Parque Industrial Toluca 2000  
Toluca, Edo. de Mexico CP 50100  
Tel: 52 722 275 4200  
Fax: 52 722 275 0277

## Europe

**Hydraulics Group Headquarters**  
La Tuilière 6  
CH 1163 Étoy, Switzerland  
Tel: +41 21 821 8500  
Fax: +41 21 821 8580

**AT – Austria**, Wiener Neustadt  
Tel: +43 2622-23501-0  
Fax: +43 2622-23501-88101

**DE – Germany**, Karstadt  
Tel: +49 2131 4016 0  
Fax: +49 2131 4016 9199

## Asia Pacific

**AU – Australia**, Castle Hill  
Tel: +61 2 9634 7777  
Fax: +61 2 9899 6184

**CN – China**, Shanghai  
Tel: +86 21 2899 5000  
Fax: +86 21 5834 8975

**HK – Hong Kong**, Kowloon  
Tel: +852 2480 4256

## South America

**AR – Argentina**, Buenos Aires  
Tel: +54 3327 44 4129  
Fax: +54 3327 44 4199

**BR – Brazil**, Cachoeirinha RS  
Tel: +55 51 3470 9144  
Fax: +55 51 3470 9215

## Industrial Sales, N.A.

### Central Region

1042 Maple Avenue, Unit 331  
Lisle, IL 60532 USA  
Tel: 440-516-3216  
Fax: 440-943-1424

### Great Lakes Region

30240 Lakeland Blvd  
Wickliffe, OH 44092 USA  
Tel: 440-516-3216  
Fax: 440-943-1424

### Golf Region

11151 Cash Rd  
Stafford, TX 77477 USA  
Tel: 817-473-4431  
Fax: 888-227-9454

### Mid-Atlantic Region

125 E. Meadowview Road  
Greensboro, NC 27406 USA  
Tel: (336) 202-6068  
Fax: (866) 608-1837

### Midwest and Mississippi Valley Regions

8145 Lewis Road  
Minneapolis, MN 55427 USA  
Tel: 763-513-3535  
Fax: 763-544-3418

### Northeast Region

Parker Hannifin Corporation  
P.O. Box 778  
Pine Brook, NJ 07058 USA  
Tel: 973-227-2565  
Fax: 973-461-7509

### Northwest Region

6458 North Basin Avenue  
Portland, OR 97217 USA  
Tel: 503-283-1020  
Fax: 866-611-7308

### Pacific and Mountain Regions

8460 Kass Drive  
Buena Park, CA 90621 USA  
Tel: 714-228-2510  
Fax: 714-228-2511

### South America

**AR – Argentina**, Buenos Aires  
Tel: +54 3327 44 4129  
Fax: +54 3327 44 4199

**BR – Brazil**, Cachoeirinha RS  
Tel: +55 51 3470 9144  
Fax: +55 51 3470 9215

### Southeast Region

700 S. 4th Avenue  
Mansfield, TX 76063 USA  
Tel: 817-473-4431  
Fax: 888-227-9454

### Southwest Region

12600 Deerfield Parkway  
Suite 100  
Alpharetta, GA 30004 USA  
Tel: (614) 202-9968  
Fax: (866) 608-1837

### Mobile Sales, N.A.

**Mobile Sales Organization and Global Sales**  
850 Arthur Avenue  
Elk Grove Village, IL 60007 USA  
Tel: 847-258-6200  
Fax: 847-258-6299

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