Piston Accumulators

A Series 250 and 350 bar
**Benefits**

1, 2 & 3. Shell and Caps

Effective heat dissipation is vital for long seal life. Compact, rugged steel shell and end caps allow heat to dissipate efficiently, while the bore of the accumulator is micro-finished to maximise seal life. Downtime is minimised by the use of threaded caps to simplify maintenance of the accumulator, permitting quick and easy installation of seals.

4. Piston

Rapid response in high cycling applications is assured by Parker’s lightweight piston design. The dished profile of the aluminium piston gives extra gas capacity while maintaining stability in the bore, and permits a greater usable volume of fluid. Piston position sensors, available as an optional feature, enable the condition of the accumulator’s precharge to be monitored.

5. Piston Sealing

Long service intervals are made possible by total separation of oil and gas, even under the most severe operating conditions. Parker’s A Series accumulators feature a wide piston seal assembly comprising a unique five-bladed V-profile O-ring with back-up washers, which eliminates seal roll-over even in high speed applications. The V-O-ring holds full pressure throughout long idle periods between cycles, providing dependable, full pressure storage of hydraulic energy.

6. PTFE Bearing Rings

To reduce wear and extend service life, carbon-filled PTFE bearing rings are fitted, eliminating metal-to-metal contact between the piston and bore.

7. Safety Bleed Grooves

A bleed groove in the gas cap progressively releases unrelieved gas pressure in the accumulator as the gas cap is unscrewed. **Note:** to avoid the risk of damage or injury, an accumulator must always be discharged before disassembly.

8. Gas Valve

To avoid the risk of damage or injury, an accumulator must be discharged before disassembling. For added safety, the gas valves fitted by Parker vent progressively as they are unscrewed. A robust, cored-type gas valve rated at 350 bar is fitted as standard to all A Series piston accumulators. A mechanically opened and closed poppet-type gas valve cartridge, also rated at 350 bar, is available as an option.

9. Gas Valve Protector

To prevent accidental – and potentially hazardous – damage to the gas valve, the steel gas valve protector reduces the risk to the valve from external impact.

10. Ports

To provide the required flow rate and simplify system design, a wide range of port types and sizes is available. BSPP ports are supplied as standard; ISO, metric and SAE threaded and metric flanged ports to ISO 6162 are available to special order.
Applications

- Industrial Hydraulic Power Units
- Machine Tools
- Automotive
- Marine & Offshore
- Oil & Gas
- Renewable & Wind Energy
- Power Generation
- Mining
- Transport Rail & Truck
- Mobile Construction & Agriculture

Functions

- Dampen Pulsation and Pressure Spikes
- Supply in Emergency - power loss
- Compensate Thermal Changes
- Supplement Flow Requirement - Energy saving
- Compensate External actuator shock

Main Features

Actual Bore Sizes & Maximum Flow Rates

<table>
<thead>
<tr>
<th>Model</th>
<th>Pressure</th>
<th>Nominal Bore Ø</th>
<th>Actual Bore Ø</th>
<th>Max. Recommended Flow Rate*</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>bar</td>
<td>mm</td>
<td>mm</td>
<td>l/m</td>
</tr>
<tr>
<td>A2</td>
<td>250/350</td>
<td>50</td>
<td>51.4</td>
<td>380</td>
</tr>
<tr>
<td>A3</td>
<td>250/350</td>
<td>75</td>
<td>76.2</td>
<td>825</td>
</tr>
<tr>
<td>A4</td>
<td>250/350</td>
<td>100</td>
<td>102.4</td>
<td>1500</td>
</tr>
<tr>
<td>A5</td>
<td>250</td>
<td>125</td>
<td>127</td>
<td>2200</td>
</tr>
<tr>
<td>A6</td>
<td>250/350</td>
<td>150</td>
<td>146.9</td>
<td>3100</td>
</tr>
<tr>
<td>A8</td>
<td>250</td>
<td>200</td>
<td>200</td>
<td>5700</td>
</tr>
</tbody>
</table>

*Note: Based on 4m/sec maximum piston speed, port & fitting size will become limiting factors for most applications.

Bore Size, Pressures & Temperature Range

<table>
<thead>
<tr>
<th>Bore Size (mm)</th>
<th>Max. Working Pressure (bar)</th>
<th>Volume (Litres)</th>
<th>Material Working Temperature Range °C</th>
</tr>
</thead>
<tbody>
<tr>
<td>A2</td>
<td>250/350</td>
<td>0.08-2</td>
<td>-20°C to +150°C Material to -40°C available on request</td>
</tr>
<tr>
<td>A3</td>
<td>250/350</td>
<td>0.25-8</td>
<td></td>
</tr>
<tr>
<td>A4</td>
<td>250/350</td>
<td>0.7-12</td>
<td></td>
</tr>
<tr>
<td>A5</td>
<td>250</td>
<td>2-14</td>
<td></td>
</tr>
<tr>
<td>A6</td>
<td>250/350</td>
<td>3.8-38</td>
<td></td>
</tr>
<tr>
<td>A8</td>
<td>250</td>
<td>9.5-76</td>
<td></td>
</tr>
</tbody>
</table>

Materials

- Shell – high strength steel
- End caps – steel
- Pistons – lightweight aluminium alloy
- Cast iron low temperature Arctic piston available upon request
- Piston and end cap seals – NBR (standard); other compounds to suit application
- Piston seal backup washers – PTFE
- Piston bearing rings – PTFE
- Gas valve assembly – stainless steel
- Gas valve protector – steel
- Paint finish – black primer (standard – others on request)

Custom Designs

For unique applications and hostile environments, different designs, materials and coatings can be supplied. Please contact our engineering department to discuss custom solutions to individual application requirements.
**250 and 350 Bar Pressure Ranges**

A Series accumulators are available to suit maximum working pressures of 250 and 350 bar. The same premium quality design and technical features guarantee optimum performance and service life from every model, while differing wall thicknesses to suit 250 or 350 bar working pressures allow the designer to specify precisely the right performance envelope for the application.

### Available Options

A wide variety of options are available for A Series accumulators, including:
- Threaded and manifold port styles and sizes
- Seal compounds
- Metric and inch mounting styles
- High flow gas ports for use with remote gas storage bottles
- Water service versions
- Gas valves
- Safety fuses
- Accumulator mounting systems
- Precharge monitors and piston position sensors
- Certifications to suit different market requirements

### Water Service

A Series piston accumulators are available for use with water as the fluid medium. Modifications include plating of all working surfaces. Please consult Parker for details.

### Operating Temperatures, Seals and Fluids

A Series piston accumulators are fitted as standard with nitrile (NBR) seals. A range of alternative seal materials is available for use at higher or lower temperatures, or with synthetic or high water content fluids, as shown in the table. Other seals are also available for use in exceptional conditions – please consult the factory with details of the application. The shells of Parker’s A series accumulators are CE approved for operation at temperatures between -40°C and +150°C.

<table>
<thead>
<tr>
<th>Code</th>
<th>Seal Type</th>
<th>&quot;Min Temp&quot;</th>
<th>&quot;Max Temp&quot;</th>
<th>&quot;Fluid Classification&quot;</th>
<th>&quot;Fluid Type&quot;</th>
<th>Maximum Velocity (m/s)</th>
</tr>
</thead>
<tbody>
<tr>
<td>K</td>
<td>&quot;NBR (Nitrile)&quot;</td>
<td>-29°C</td>
<td>74°C</td>
<td>&quot;HFB-HFC-HM-HV&quot;</td>
<td>&quot;Mineral Oils &amp; Water Glycols&quot;</td>
<td>4 m/s</td>
</tr>
<tr>
<td>H</td>
<td>&quot;HNBR (Hydrogenated Nitrile)&quot;</td>
<td>-32°C</td>
<td>150°C</td>
<td>&quot;HFB-HFC-HM-HV&quot;</td>
<td>&quot;Mineral Oils &amp; Water Glycols&quot;</td>
<td>4 m/s</td>
</tr>
<tr>
<td>E</td>
<td>&quot;FPM (Fluorocarbon elastomer)&quot;</td>
<td>-23°C</td>
<td>121°C</td>
<td>&quot;HFB-HM-HV&quot;</td>
<td>&quot;Synthetic Oils&quot;</td>
<td>4 m/s</td>
</tr>
<tr>
<td>D</td>
<td>&quot;EPDM (Ethylene Propylene)&quot;</td>
<td>-40°C</td>
<td>121°C</td>
<td>HFD</td>
<td>&quot;Ester Fluids&quot;</td>
<td>4 m/s</td>
</tr>
<tr>
<td>Q</td>
<td>&quot;LT-NBR (Low Temperature Nitrile)&quot;</td>
<td>-45°C</td>
<td>71°C</td>
<td>HM-HV</td>
<td>&quot;Mineral Oils&quot;</td>
<td>4 m/s</td>
</tr>
<tr>
<td>X</td>
<td>&quot;Low Friction T Seal Consult Parker ACDE&quot;</td>
<td>-43°C</td>
<td>121°C</td>
<td>HM-HV</td>
<td>&quot;Mineral Oils &amp; Water Glycols&quot;</td>
<td>4 m/s</td>
</tr>
<tr>
<td>S</td>
<td>&quot;Special Consult Parker ACDE*&quot;</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>4 m/s</td>
</tr>
</tbody>
</table>

**Filtration**

For maximum component life, the system should be protected from contamination by effective filtration. Fluid cleanliness should be in accordance with ISO 4406. The quality of filters should be in accordance with the appropriate ISO standards. The rating of the filter media depends on the system components and the application. The minimum required for hydraulic systems should be class 19/15 to ISO 4406, which equates to 25μ (β10≥75) to ISO 4572.

### Safety

Charging must be carried out by qualified personnel. Before taking any readings or pressurizing with nitrogen, the accumulator must be isolated from the hydraulic system and the fluid side discharged in order to depressurize it. Use only nitrogen (N₂) to pressurize the accumulator.

### Danger of Explosion – Never Charge with Oxygen

The types of nitrogen permitted are: type S (99.8% pure); type R (99.99% pure); type U (99.993% pure).

### Approvals

Other approvals available upon request.

### Mounting

The optimum mounting orientation is vertical however angled and horizontal mountings are permissible if the hydraulic fluid is kept clean; high levels of contaminants in the fluid can result in uneven or accelerated seal wear.

---

**Seals, Fluids and Temperature Ranges**

<table>
<thead>
<tr>
<th>Code</th>
<th>Seal Type</th>
<th>&quot;Min Temp&quot;</th>
<th>&quot;Max Temp&quot;</th>
<th>&quot;Fluid Classification&quot;</th>
<th>&quot;Fluid Type&quot;</th>
<th>Maximum Velocity (m/s)</th>
</tr>
</thead>
<tbody>
<tr>
<td>K</td>
<td>&quot;NBR (Nitrile)&quot;</td>
<td>-29°C</td>
<td>74°C</td>
<td>&quot;HFB-HFC-HM-HV&quot;</td>
<td>&quot;Mineral Oils &amp; Water Glycols&quot;</td>
<td>4 m/s</td>
</tr>
<tr>
<td>H</td>
<td>&quot;HNBR (Hydrogenated Nitrile)&quot;</td>
<td>-32°C</td>
<td>150°C</td>
<td>&quot;HFB-HFC-HM-HV&quot;</td>
<td>&quot;Mineral Oils &amp; Water Glycols&quot;</td>
<td>4 m/s</td>
</tr>
<tr>
<td>E</td>
<td>&quot;FPM (Fluorocarbon elastomer)&quot;</td>
<td>-23°C</td>
<td>121°C</td>
<td>&quot;HFB-HM-HV&quot;</td>
<td>&quot;Synthetic Oils&quot;</td>
<td>4 m/s</td>
</tr>
<tr>
<td>D</td>
<td>&quot;EPDM (Ethylene Propylene)&quot;</td>
<td>-40°C</td>
<td>121°C</td>
<td>HFD</td>
<td>&quot;Ester Fluids&quot;</td>
<td>4 m/s</td>
</tr>
<tr>
<td>Q</td>
<td>&quot;LT-NBR (Low Temperature Nitrile)&quot;</td>
<td>-45°C</td>
<td>71°C</td>
<td>HM-HV</td>
<td>&quot;Mineral Oils&quot;</td>
<td>4 m/s</td>
</tr>
<tr>
<td>X</td>
<td>&quot;Low Friction T Seal Consult Parker ACDE&quot;</td>
<td>-43°C</td>
<td>121°C</td>
<td>HM-HV</td>
<td>&quot;Mineral Oils &amp; Water Glycols&quot;</td>
<td>4 m/s</td>
</tr>
<tr>
<td>S</td>
<td>&quot;Special Consult Parker ACDE*&quot;</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>4 m/s</td>
</tr>
</tbody>
</table>
## Dimensions

### 250 and 350 Bar Models, Capacities and Dimensions

<table>
<thead>
<tr>
<th>Model</th>
<th>Code</th>
<th>Bore Ø</th>
<th>Fluid Volume Litres</th>
<th>Gas Volume Litres</th>
<th>250 bar</th>
<th>350 bar</th>
<th>C mm</th>
<th>E* mm</th>
<th>F mm</th>
<th>G mm</th>
<th>250 bar Weight Kg</th>
<th>350 bar Weight Kg</th>
</tr>
</thead>
<tbody>
<tr>
<td>A2</td>
<td>005</td>
<td>51.4</td>
<td>0.1</td>
<td>0.1</td>
<td>172</td>
<td>172</td>
<td>27</td>
<td>-</td>
<td>-</td>
<td></td>
<td>1.8</td>
<td>2.7</td>
</tr>
<tr>
<td></td>
<td>0010</td>
<td>51.4</td>
<td>0.15</td>
<td>0.2</td>
<td>211</td>
<td>211</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td></td>
<td>2</td>
<td>3</td>
</tr>
<tr>
<td></td>
<td>0015</td>
<td>51.4</td>
<td>0.25</td>
<td>0.25</td>
<td>250</td>
<td>250</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td></td>
<td>2.5</td>
<td>3.3</td>
</tr>
<tr>
<td></td>
<td>0029</td>
<td>51.4</td>
<td>0.5</td>
<td>0.5</td>
<td>360</td>
<td>360</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td></td>
<td>3</td>
<td>4.3</td>
</tr>
<tr>
<td></td>
<td>0058</td>
<td>51.4</td>
<td>1</td>
<td>1</td>
<td>590</td>
<td>590</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td></td>
<td>4.4</td>
<td>6.2</td>
</tr>
<tr>
<td>A3</td>
<td>0029</td>
<td>76.2</td>
<td>0.5</td>
<td>0.55</td>
<td>260</td>
<td>260</td>
<td>29</td>
<td>M10</td>
<td>60</td>
<td>15</td>
<td>9</td>
<td>9</td>
</tr>
<tr>
<td></td>
<td>0058</td>
<td>76.2</td>
<td>1</td>
<td>1</td>
<td>364</td>
<td>364</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td></td>
<td>11</td>
<td>11</td>
</tr>
<tr>
<td></td>
<td>0090</td>
<td>76.2</td>
<td>1.5</td>
<td>1.5</td>
<td>481</td>
<td>481</td>
<td>29</td>
<td>M10</td>
<td>60</td>
<td>15</td>
<td>13</td>
<td>13</td>
</tr>
<tr>
<td></td>
<td>0116</td>
<td>76.2</td>
<td>2</td>
<td>2</td>
<td>573</td>
<td>573</td>
<td>14</td>
<td>-</td>
<td>-</td>
<td></td>
<td>16</td>
<td>20</td>
</tr>
<tr>
<td></td>
<td>0183</td>
<td>76.2</td>
<td>3</td>
<td>3</td>
<td>814</td>
<td>814</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td></td>
<td>16</td>
<td>20</td>
</tr>
<tr>
<td>A4</td>
<td>0058</td>
<td>102.4</td>
<td>1</td>
<td>1.1</td>
<td>295</td>
<td>306</td>
<td>29</td>
<td>M12</td>
<td>82</td>
<td>18</td>
<td>15</td>
<td>18</td>
</tr>
<tr>
<td></td>
<td>0116</td>
<td>102.4</td>
<td>2</td>
<td>2</td>
<td>411</td>
<td>422</td>
<td>18</td>
<td>-</td>
<td>-</td>
<td></td>
<td>18</td>
<td>22</td>
</tr>
<tr>
<td></td>
<td>0231</td>
<td>102.4</td>
<td>3.8</td>
<td>4</td>
<td>640</td>
<td>651</td>
<td>29</td>
<td>M12</td>
<td>82</td>
<td>18</td>
<td>23</td>
<td>30</td>
</tr>
<tr>
<td>A5</td>
<td>0058</td>
<td>127</td>
<td>1</td>
<td>1.3</td>
<td>272</td>
<td>-</td>
<td>29</td>
<td>M12</td>
<td>100</td>
<td>18</td>
<td>22</td>
<td>-</td>
</tr>
<tr>
<td></td>
<td>0116</td>
<td>127</td>
<td>2</td>
<td>2.2</td>
<td>346</td>
<td>-</td>
<td>32</td>
<td>-</td>
<td>-</td>
<td></td>
<td>26</td>
<td>-</td>
</tr>
<tr>
<td></td>
<td>0231</td>
<td>127</td>
<td>3.8</td>
<td>4.1</td>
<td>496</td>
<td>-</td>
<td>39</td>
<td>-</td>
<td>-</td>
<td></td>
<td>26</td>
<td>-</td>
</tr>
<tr>
<td></td>
<td>0347</td>
<td>127</td>
<td>5.7</td>
<td>6</td>
<td>645</td>
<td>-</td>
<td>52</td>
<td>-</td>
<td>-</td>
<td></td>
<td>39</td>
<td>-</td>
</tr>
<tr>
<td></td>
<td>0578</td>
<td>127</td>
<td>9.5</td>
<td>9.8</td>
<td>943</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td></td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>A6</td>
<td>0231</td>
<td>146.9</td>
<td>3.8</td>
<td>4.3</td>
<td>442</td>
<td>487</td>
<td>29</td>
<td>M12</td>
<td>110</td>
<td>18</td>
<td>35</td>
<td>53</td>
</tr>
<tr>
<td></td>
<td>0547</td>
<td>146.9</td>
<td>5.7</td>
<td>6.2</td>
<td>554</td>
<td>600</td>
<td>42</td>
<td>-</td>
<td>-</td>
<td></td>
<td>42</td>
<td>60</td>
</tr>
<tr>
<td></td>
<td>0578</td>
<td>146.9</td>
<td>9.5</td>
<td>10</td>
<td>778</td>
<td>824</td>
<td>54</td>
<td>-</td>
<td>-</td>
<td></td>
<td>54</td>
<td>74</td>
</tr>
<tr>
<td></td>
<td>0924</td>
<td>146.9</td>
<td>15</td>
<td>15.7</td>
<td>1113</td>
<td>1139</td>
<td>73</td>
<td>-</td>
<td>-</td>
<td></td>
<td>73</td>
<td>96</td>
</tr>
<tr>
<td></td>
<td>1155</td>
<td>146.9</td>
<td>19</td>
<td>19.4</td>
<td>1337</td>
<td>1383</td>
<td>85</td>
<td>-</td>
<td>-</td>
<td></td>
<td>85</td>
<td>110</td>
</tr>
<tr>
<td></td>
<td>1733</td>
<td>146.9</td>
<td>28.5</td>
<td>28.9</td>
<td>1896</td>
<td>1941</td>
<td>112</td>
<td>-</td>
<td>-</td>
<td></td>
<td>112</td>
<td>148</td>
</tr>
<tr>
<td></td>
<td>2310</td>
<td>146.9</td>
<td>38</td>
<td>38.4</td>
<td>2454</td>
<td>2500</td>
<td>147</td>
<td>-</td>
<td>-</td>
<td></td>
<td>147</td>
<td>183</td>
</tr>
<tr>
<td>A8</td>
<td>0578</td>
<td>200</td>
<td>9.5</td>
<td>10.7</td>
<td>628</td>
<td>-</td>
<td>24</td>
<td>-</td>
<td>-</td>
<td></td>
<td>42</td>
<td>-</td>
</tr>
<tr>
<td></td>
<td>1155</td>
<td>200</td>
<td>19</td>
<td>20.2</td>
<td>931</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td></td>
<td>98</td>
<td>122</td>
</tr>
<tr>
<td></td>
<td>1733</td>
<td>200</td>
<td>28.5</td>
<td>29.7</td>
<td>1232</td>
<td>-</td>
<td>170</td>
<td>-</td>
<td>-</td>
<td></td>
<td>146</td>
<td>-</td>
</tr>
<tr>
<td></td>
<td>2310</td>
<td>200</td>
<td>38</td>
<td>39.1</td>
<td>1532</td>
<td>-</td>
<td>189</td>
<td>-</td>
<td>-</td>
<td></td>
<td>170</td>
<td>-</td>
</tr>
<tr>
<td></td>
<td>2772</td>
<td>200</td>
<td>45</td>
<td>46.2</td>
<td>1774</td>
<td>-</td>
<td>194</td>
<td>-</td>
<td>-</td>
<td></td>
<td>189</td>
<td>-</td>
</tr>
<tr>
<td></td>
<td>2888</td>
<td>200</td>
<td>47</td>
<td>48.2</td>
<td>1834</td>
<td>-</td>
<td>217</td>
<td>-</td>
<td>-</td>
<td></td>
<td>194</td>
<td>-</td>
</tr>
<tr>
<td></td>
<td>3465</td>
<td>200</td>
<td>57</td>
<td>58</td>
<td>2136</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td></td>
<td>217</td>
<td>-</td>
</tr>
<tr>
<td></td>
<td>4620</td>
<td>200</td>
<td>76</td>
<td>77.2</td>
<td>2738</td>
<td>-</td>
<td>266</td>
<td>-</td>
<td>-</td>
<td></td>
<td>-</td>
<td>-</td>
</tr>
</tbody>
</table>

1 Where the optional poppet-type gas valve is fitted (see page 6), dimension C should be increased by 13mm.

2 A Series piston accumulators are supplied as standard with the metric threaded mounting holes shown in the table. They are also available with inch pattern mounting holes, indicated by the Design Number in the model code – see page 9.
Gas Valves
The standard gas charging valve fitted to A Series 250 and 350 bar piston accumulators is a cored-type gas valve, rated at 350 bar. A mechanically opened and closed poppet-type gas valve cartridge, also rated at 350 bar, is available as an option.

Optional Features and Spares
Piston Accumulators
A Series

Safety Fuses (Burst Discs)
Safety fuses are available on A Series accumulators to prevent over-pressurization of gas due to external heat or excess hydraulic pressure. They comprise a housing incorporating a disc which is calibrated to rupture at a predetermined pressure, to be specific by the customer at the time of ordering. Please contact the factory for further information.

Available Options
If your application requires a piston accumulator, gas bottle, or special option that falls outside of Parker’s broad offering, consult your local distributor, Parker representative, or the factory with your specific requirements. Parker has the manufacturing and engineering expertise to design and build piston accumulators to your exacting requirements, from simple modifications of standard units to complete designs.

Some example of Parker’s past special designs include:
• High Pressures
• Special and Stainless Steel Materials
• Piston Position and Velocity Sensors and Switches
• Water Service
• Non-Standard Capacities
• Extreme Temperatures

Seal Kits
Seal Kit Part Numbers with piston seals assembled (remove the P for a Seal Kit without piston seal assembled)

- **Model**
- **Nitrile NBR**
- **Fluorocarbon Elastomer FPM**
- **Ethylene Propylene EPR**
- **Hydrogenated Nitrile HNBR**
- **Carboxilated Nitrile XNBR**
- **Low Temp. Nitrile NBR**

<table>
<thead>
<tr>
<th>Model</th>
<th>Nitrile NBR</th>
<th>Fluorocarbon Elastomer FPM</th>
<th>Ethylene Propylene EPR</th>
<th>Hydrogenated Nitrile HNBR</th>
<th>Carboxilated Nitrile XNBR</th>
<th>Low Temp. Nitrile NBR</th>
</tr>
</thead>
<tbody>
<tr>
<td>A2</td>
<td>RK0200K000P</td>
<td>RK0200E000P</td>
<td>RK0200D000P</td>
<td>RK0200H000P</td>
<td>RK0200J000P</td>
<td>RK0200Q000P</td>
</tr>
<tr>
<td>A3</td>
<td>RK0300K000P</td>
<td>RK0300E000P</td>
<td>RK0300D000P</td>
<td>RK0300H000P</td>
<td>RK0300J000P</td>
<td>RK0300Q000P</td>
</tr>
<tr>
<td>A4</td>
<td>RK0400K000P</td>
<td>RK0400E000P</td>
<td>RK0400D000P</td>
<td>RK0400H000P</td>
<td>RK0400J000P</td>
<td>RK0400Q000P</td>
</tr>
<tr>
<td>A5</td>
<td>RK0500K000P</td>
<td>RK0500E000P</td>
<td>RK0500D000P</td>
<td>RK0500H000P</td>
<td>RK0500J000P</td>
<td>RK0500Q000P</td>
</tr>
<tr>
<td>A6</td>
<td>RK0600K000P</td>
<td>RK0600E000P</td>
<td>RK0600D000P</td>
<td>RK0600H000P</td>
<td>RK0600J000P</td>
<td>RK0600Q000P</td>
</tr>
<tr>
<td>A8</td>
<td>RK0800K000P</td>
<td>RK0800E000P</td>
<td>RK0800D000P</td>
<td>RK0800H000P</td>
<td>RK0800J000P</td>
<td>RK0800Q000P</td>
</tr>
</tbody>
</table>

Both types of charging valve may be used with the Charging and Gauging Kit illustrated on page 7.

Piston Accumulator Seal Kits
Seal kits are available for all A Series accumulator models however it is recommended to buy a piston assembly with seal already assembled.

When ordering seal kits, please supply the complete model number from the identification plate and specify the fluid type and the temperature at which the accumulator is to be used.

Seal Kit Numbers
The seal kits listed contain items 5, 6, 7, 8, 9 and 11.

Parts List
1. Shell
2. Hydraulic cap
3. Gas cap
4. Piston
5. V-O-ring
6. V-O-ring back-up washers
7. PTFE bearing ring (piston)
8. O-ring
9. O-ring back-up washer

Seal Kits
Seal Kit Part Numbers with piston seals assembled (remove the P for a Seal Kit without piston seal assembled)
### Piston Accumulators

#### A Series

**Accessories**

### ‘U’ Bolts for Piston Accumulators

![Diagram of 'U' Bolts](image)

<table>
<thead>
<tr>
<th>Model</th>
<th>Part No.</th>
<th>A</th>
<th>B</th>
<th>C</th>
<th>D</th>
<th>E</th>
<th>F</th>
</tr>
</thead>
<tbody>
<tr>
<td>A2</td>
<td>PE1093-4</td>
<td>M6 x 1</td>
<td>62</td>
<td>68</td>
<td>70</td>
<td>45</td>
<td>10</td>
</tr>
<tr>
<td>A3</td>
<td>PE1093-1</td>
<td>M8 x 1.25</td>
<td>96</td>
<td>104</td>
<td>92</td>
<td>60</td>
<td>10</td>
</tr>
<tr>
<td>A4</td>
<td>PE1093-2</td>
<td>M12 x 1.75</td>
<td>128</td>
<td>140</td>
<td>114</td>
<td>76</td>
<td>10</td>
</tr>
<tr>
<td>A5</td>
<td>PE1093-12</td>
<td>M12 x 1.75</td>
<td>158</td>
<td>170</td>
<td>140</td>
<td>76</td>
<td>15</td>
</tr>
<tr>
<td>A6</td>
<td>PE1093-3</td>
<td>M16 x 2</td>
<td>180</td>
<td>196</td>
<td>155</td>
<td>95</td>
<td>20</td>
</tr>
<tr>
<td>A8</td>
<td>PE1093-13</td>
<td>M16 x 2</td>
<td>234</td>
<td>250</td>
<td>200</td>
<td>95</td>
<td>20</td>
</tr>
</tbody>
</table>

**Min**

**Max**

**Note:** ‘U’ bolts should be mounted within the distances shown from the end of the accumulator, to avoid deformation of the shell.

### Charging and Gauging

The charging and gauging assemblies listed in the table are suitable for use with both the standard cored-type gas valve and the optional poppet type. Each kit contains a UCA assembly incorporating a gas valve, bleed valve and gas chuck, and a 3m long charging hose with standard nitrogen bottle fittings. The kit includes 25 bar and 250 bar pressure gauges, to permit easy monitoring of the gas precharge.

<table>
<thead>
<tr>
<th>Territory</th>
<th>Gas Bottle Fitting</th>
<th>Part No.</th>
</tr>
</thead>
<tbody>
<tr>
<td>UK</td>
<td>5/8 BSP (male)</td>
<td>UCA 02</td>
</tr>
<tr>
<td>France</td>
<td>W 21.7 x 1/14” (female)</td>
<td>UCA 04</td>
</tr>
<tr>
<td>Germany</td>
<td>W 24.32 x 1/14” (female)</td>
<td>UCA 01</td>
</tr>
<tr>
<td>Italy</td>
<td>W 21.7 x 1/14” (male)</td>
<td>UCA 05</td>
</tr>
<tr>
<td>US</td>
<td>0.960 x 1/14” (male)</td>
<td>UCA 03</td>
</tr>
<tr>
<td>Universal</td>
<td>All available fittings (includes all fittings above)</td>
<td>UCA UNI</td>
</tr>
</tbody>
</table>

All dimensions are in millimetres unless otherwise stated.

**Please note:**

Resistant parts cannot be supplied as spares (tubes/end caps)
Fluid Ports - Standard

<table>
<thead>
<tr>
<th>Port Type</th>
<th>Code</th>
</tr>
</thead>
<tbody>
<tr>
<td>G 3/4 BSPP</td>
<td>Leave Blank</td>
</tr>
<tr>
<td>G 1 BSPP</td>
<td>Leave Blank</td>
</tr>
<tr>
<td>G 1 1/2 BSPP</td>
<td>Leave Blank</td>
</tr>
<tr>
<td>G 2 BSPP</td>
<td>Leave Blank</td>
</tr>
</tbody>
</table>

Optional Threaded Ports

### BSPP ¹

<table>
<thead>
<tr>
<th>Thread Size</th>
<th>From Model</th>
<th>Code</th>
<th>Thread Size</th>
<th>From Model</th>
<th>Code</th>
<th>Thread Size</th>
<th>From Model</th>
<th>Code</th>
</tr>
</thead>
<tbody>
<tr>
<td>G 3/4</td>
<td>A2</td>
<td>RC</td>
<td>M14</td>
<td>A2</td>
<td>GA</td>
<td>M14</td>
<td>A2</td>
<td>YA</td>
</tr>
<tr>
<td>G 1 1/4</td>
<td>A3</td>
<td>RD</td>
<td>M18</td>
<td>A2</td>
<td>GB</td>
<td>M18</td>
<td>A2</td>
<td>YB</td>
</tr>
<tr>
<td>G 1 1/2</td>
<td>A4</td>
<td>RF</td>
<td>M27</td>
<td>A2</td>
<td>GC</td>
<td>M22</td>
<td>A2</td>
<td>YC</td>
</tr>
<tr>
<td>G 2</td>
<td>A4</td>
<td>RG</td>
<td>M33</td>
<td>A3</td>
<td>GE</td>
<td>M42</td>
<td>A3</td>
<td>YE</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

### Metric to DIN 3852-1

<table>
<thead>
<tr>
<th>Flange</th>
<th>Size</th>
<th>From Model</th>
<th>Code</th>
</tr>
</thead>
<tbody>
<tr>
<td>DN13</td>
<td>A3</td>
<td>M8</td>
<td>17.5</td>
</tr>
<tr>
<td>DN19</td>
<td>A3</td>
<td>M10</td>
<td>22.3</td>
</tr>
<tr>
<td>DN25</td>
<td>A3</td>
<td>M10</td>
<td>26.2</td>
</tr>
<tr>
<td>DN32</td>
<td>A3</td>
<td>M10</td>
<td>30.2</td>
</tr>
<tr>
<td>DN38</td>
<td>A4</td>
<td>M12</td>
<td>35.7</td>
</tr>
<tr>
<td>DN51</td>
<td>A4</td>
<td>M12</td>
<td>42.9</td>
</tr>
<tr>
<td>DN64</td>
<td>A6</td>
<td>M12</td>
<td>50.8</td>
</tr>
<tr>
<td>DN76</td>
<td>A8</td>
<td>M16</td>
<td>61.9</td>
</tr>
</tbody>
</table>

### Metric to ISO 6149-1

<table>
<thead>
<tr>
<th>Flange</th>
<th>Size</th>
<th>From Model</th>
<th>Code</th>
</tr>
</thead>
<tbody>
<tr>
<td>DN13</td>
<td>A3</td>
<td>M8</td>
<td>17.5</td>
</tr>
<tr>
<td>DN19</td>
<td>A3</td>
<td>M10</td>
<td>22.3</td>
</tr>
<tr>
<td>DN25</td>
<td>A3</td>
<td>M10</td>
<td>26.2</td>
</tr>
<tr>
<td>DN32</td>
<td>A3</td>
<td>M10</td>
<td>30.2</td>
</tr>
<tr>
<td>DN38</td>
<td>A4</td>
<td>M12</td>
<td>35.7</td>
</tr>
<tr>
<td>DN51</td>
<td>A4</td>
<td>M12</td>
<td>42.9</td>
</tr>
<tr>
<td>DN64</td>
<td>A6</td>
<td>M12</td>
<td>50.8</td>
</tr>
<tr>
<td>DN76</td>
<td>A8</td>
<td>M16</td>
<td>61.9</td>
</tr>
</tbody>
</table>

### SAE Thread

<table>
<thead>
<tr>
<th>Flange</th>
<th>Size</th>
<th>From Model</th>
<th>Code</th>
</tr>
</thead>
<tbody>
<tr>
<td>A2</td>
<td>M6 x 1</td>
<td>24.7</td>
<td>10.0</td>
</tr>
<tr>
<td>A2</td>
<td>M8 x 1.25</td>
<td>29.7</td>
<td>13.0</td>
</tr>
<tr>
<td>A3</td>
<td>M8 x 1.25</td>
<td>35.4</td>
<td>19.0</td>
</tr>
<tr>
<td>A3</td>
<td>M10 x 1.5</td>
<td>43.8</td>
<td>25.0</td>
</tr>
<tr>
<td>A3</td>
<td>M12 x 1.75</td>
<td>51.6</td>
<td>32.0</td>
</tr>
<tr>
<td>A4</td>
<td>M16 x 2</td>
<td>60.1</td>
<td>38.0</td>
</tr>
<tr>
<td>A6</td>
<td>M20 x 2.5</td>
<td>83.4</td>
<td>56.0</td>
</tr>
</tbody>
</table>

¹ Where the required fluid port is the standard BSPP size for the accumulator bore diameter chosen (see dimension D, page 5), the fluid port field in the order code on page 9 should be left blank.

Optional Flanged Ports

A Series Piston Accumulators are available with metric flange ports to ISO 6162/3000 psi and ISO 6164/6000 psi as shown in the tables. Inch pattern flange ports and flange ports for higher pressure operation are also available, please consult the factory for details.

ISO 6162 Flanged Port Dimensions

ISO 6164 Flanged Port Dimensions

Flange Ports to ISO 6162/3000 psi

<table>
<thead>
<tr>
<th>Flange Size</th>
<th>From Model</th>
<th>A</th>
<th>B ± 0.25</th>
<th>C ± 0.25</th>
<th>F</th>
<th>Code</th>
</tr>
</thead>
<tbody>
<tr>
<td>DN13</td>
<td>A3</td>
<td>M6</td>
<td>24.7</td>
<td>10.0</td>
<td></td>
<td>MT</td>
</tr>
<tr>
<td>DN19</td>
<td>A3</td>
<td>M10</td>
<td>29.7</td>
<td>13.0</td>
<td></td>
<td>SE</td>
</tr>
<tr>
<td>DN25</td>
<td>A3</td>
<td>M10</td>
<td>35.4</td>
<td>19.0</td>
<td></td>
<td>SF</td>
</tr>
<tr>
<td>DN32</td>
<td>A3</td>
<td>M10</td>
<td>43.8</td>
<td>25.0</td>
<td></td>
<td>SG</td>
</tr>
<tr>
<td>DN38</td>
<td>A4</td>
<td>M12</td>
<td>51.6</td>
<td>32.0</td>
<td></td>
<td>SH</td>
</tr>
<tr>
<td>DN51</td>
<td>A4</td>
<td>M12</td>
<td>60.1</td>
<td>38.0</td>
<td></td>
<td>SP</td>
</tr>
<tr>
<td>DN64</td>
<td>A6</td>
<td>M12</td>
<td>69.3</td>
<td>51.0</td>
<td></td>
<td>SQ</td>
</tr>
<tr>
<td>DN76</td>
<td>A8</td>
<td>M16</td>
<td>83.4</td>
<td>56.0</td>
<td></td>
<td>SX</td>
</tr>
</tbody>
</table>

Flange Ports to ISO 6164/6000 psi

<table>
<thead>
<tr>
<th>Flange Size</th>
<th>From Model</th>
<th>A</th>
<th>B ± 0.25</th>
<th>F ±0.0</th>
<th>Code</th>
</tr>
</thead>
<tbody>
<tr>
<td>DN10</td>
<td>A2</td>
<td>M6 x 1</td>
<td>24.7</td>
<td>10.0</td>
<td>SD</td>
</tr>
<tr>
<td>DN13</td>
<td>A2</td>
<td>M8 x 1.25</td>
<td>29.7</td>
<td>13.0</td>
<td>SE</td>
</tr>
<tr>
<td>DN19</td>
<td>A3</td>
<td>M8 x 1.25</td>
<td>35.4</td>
<td>19.0</td>
<td>SF</td>
</tr>
<tr>
<td>DN25</td>
<td>A3</td>
<td>M10 x 1.5</td>
<td>43.8</td>
<td>25.0</td>
<td>SG</td>
</tr>
<tr>
<td>DN32</td>
<td>A3</td>
<td>M12 x 1.75</td>
<td>51.6</td>
<td>32.0</td>
<td>SH</td>
</tr>
<tr>
<td>DN38</td>
<td>A4</td>
<td>M16 x 2</td>
<td>60.1</td>
<td>38.0</td>
<td>SP</td>
</tr>
<tr>
<td>DN51</td>
<td>A6</td>
<td>M16 x 2</td>
<td>69.3</td>
<td>51.0</td>
<td>SQ</td>
</tr>
<tr>
<td>DN56</td>
<td>A6</td>
<td>M20 x 2.5</td>
<td>83.4</td>
<td>56.0</td>
<td>SX</td>
</tr>
</tbody>
</table>
### How to order

#### Piston Accumulators

**A Series**

<table>
<thead>
<tr>
<th>Series</th>
<th>Model</th>
<th>Type of Construction</th>
<th>Options</th>
<th>Volume Capacity</th>
<th>Working Pressure</th>
<th>Design Number</th>
<th>Seal Type</th>
<th>Port Size</th>
<th>Gas Port</th>
<th>Pre-Charge</th>
</tr>
</thead>
<tbody>
<tr>
<td>A</td>
<td>4</td>
<td>E</td>
<td>S</td>
<td>0005</td>
<td>L</td>
<td>2</td>
<td>K</td>
<td>RF</td>
<td>S</td>
<td>/010</td>
</tr>
</tbody>
</table>

- **Code** Bore Size (nominal)
  - 2: 50 A Series
  - 3: 75 A Series
  - 4: 100 A Series
  - 5: 127 A Series
  - 6: 150 A Series
  - 8: 200 A Series

- **Code** Approval Type
  - E: CE approved

- **Code** Valve Options
  - S: Cored-type gas valve (standard)
  - W: Cored-type gas valve + water service
  - F: Cored-type gas valve + safety fuse
  - G: Cored-type gas valve + water service + safety fuse
  - M: Poppet-type gas valve
  - L: Poppet-type gas valve + water service
  - P: Poppet-type gas valve + safety fuse
  - R: Poppet-type gas valve + water service + safety fuse

Please see Dimensions table on page 5.

- **Code** Maximum Working Pressure
  - L: 250 bar (A2, A3, A4, A5, A6 & A8)
  - H: 350 bar (A2, A3, A4, A6)

- **Code** Port
  - 1: Inch mounting + SAE port
  - 2: Metric mounting + BSPP port (standard)
  - 3: Special ports
  - ###: Specials (Parker assigned number)

- **Code** Service/Fluid
  - K: Nitrile (NBR)
  - E: Fluorocarbon Elastomer (FPM)
  - H: Hydrogenated nitrile (Hnbr)
  - D: Ethylene Propylene (EPR)
  - J: Carboxilated nitrile (XNBR)
  - Q: Low temperature nitrile
  - S: Special - please specify

Please see Fluid Port tables on page 8 (leave blank if standard).

- **Gas Port**
  - Specification (where no valve supplied)
  - Pre-Charge (for example)
  - Code  Pre-Charge
  - 010  10 bar
  - 020  20 bar

---

**Hydraulic and Gas Port Modifications**

For accumulators with non-standard ports, specify special gas and/or hydraulic ports and use the appropriate port code from page 8. A typical model number for an accumulator with ISO 6149 hydraulic and gas ports would be: A - 3 - T - M - 0090 - D - 2 - K - YE/YE

---

Parker Hannifin
Accumulator Cooler Division Europe
Hellaby, UK
Accumulator Sizing Software

Parker Olaer has developed very sophisticated simulation software to optimize accumulator sizing recommendations. The behaviour of accumulators used in applications such as pulsation dampening, surge alleviation, thermal expansion and energy storage can be simulated. Our software can be downloaded from our website [www.parker.com/ACDE](http://www.parker.com/ACDE).

You may also contact your local Parker Olaer office for sizing assistance.

Calculating Accumulator Size

Accurate calculation of accumulator size requires many factors to be considered – the working volume of fluid, ambient and maximum operating temperatures, the working pressure range etc. In addition, correction factors must be applied to allow for temperature compensation between the ambient and gas temperatures, and the consequent effect on precharge pressure in the accumulator. Where the working cycle is sufficiently rapid that no heat transfer takes place, the process is termed adiabatic. Conversely, where the process takes place at a constant temperature, it is termed isothermal.

Accumulator Sizing Charts

The charts shown opposite are used to estimate the size of piston accumulator required to provide a given volume of fluid discharge from the accumulator.

The curves are based on the following formula:

$$\Delta V = 0.855 \frac{V_0}{(P_2 \div P_1)^{1/n} - 1} \times f$$

Where:
- $\Delta V$ = volume of fluid discharged
- $V_0$ = Accumulator size
- $P_2$ = maximum system pressure
- $P_1$ = minimum system pressure
- $n$ = discharge coefficient
- $f$ = charge coefficient

It is assumed that the gas precharge pressure = 0.9 $P_1$.

Isothermal and Adiabatic Operation

In constructing the curves, the following factors have been assumed.

For isothermal operation eg: slow charge and discharge time, $f$ and $n = 1$

For adiabatic operation, eg: fast charge and discharge time, $f$ and $n = 1.8$

Note: The charts provide an estimate of the volume of accumulator required to store and release a given volume of fluid under specified conditions. In practice, the true charge and discharge coefficients will depend on the application, and may cause significant variations from the chart results. If in doubt, please contact our engineering department for a more detailed calculation.

Where the ratio $P_2 / P_1$ exceeds 1.9, a fatigue analysis is necessary. Please contact our engineering department for further information.

How to Use the Sizing Chart

These charts are used to find accumulator size $V_0$ when the required output $\Delta V$ is known.

Example

Refer to the red lines in the charts opposite.

$\Delta V = 6$ litres $P_2 = 170$ bar $P_1 = 100$ bar

Step 1

As the accumulator output $\Delta V$ is known, choose the appropriate pair of charts from the two sets shown opposite. For outputs up to 50 litres use charts A and B, and for outputs above 50 litres use charts C and D. In this case, as the required output is 6 litres, charts A and B should be used.

Step 2

Calculate $P_2 / P_1$ by dividing the maximum system pressure by the minimum pressure required to make the machine function.

In this case, $170 / 100 = 1.7$

Step 3

Using chart A, locate 1.7 on the X-axis and draw a vertical line to the top of the chart.

Step 4

Depending on the cycle time, select the appropriate curve on chart A. For fast cycle times, use the adiabatic curve; for slow cycle times, the isothermal curve should be used. In this case, use the adiabatic curve. ($n$ and $f = 1.8$)

Step 5

On chart A, identify the point at which the vertical line drawn in step 3 crosses the chosen curve (in this case adiabatic) and draw a horizontal line across to the right hand end of chart B.

Accumulator Sizing Software

Parker Olaer has developed very sophisticated simulation software to optimize accumulator sizing recommendations. The behaviour of accumulators used in applications such as pulsation dampening, surge alleviation, thermal expansion and energy storage can be simulated. Our software can be downloaded from our website [www.parker.com/ACDE](http://www.parker.com/ACDE).

You may also contact your local Parker Olaer office for sizing assistance.

Calculating Accumulator Size

Accurate calculation of accumulator size requires many factors to be considered – the working volume of fluid, ambient and maximum operating temperatures, the working pressure range etc. In addition, correction factors must be applied to allow for temperature compensation between the ambient and gas temperatures, and the consequent effect on precharge pressure in the accumulator. Where the working cycle is sufficiently rapid that no heat transfer takes place, the process is termed adiabatic. Conversely, where the process takes place at a constant temperature, it is termed isothermal.

Accumulator Sizing Charts

The charts shown opposite are used to estimate the size of piston accumulator required to provide a given volume of fluid discharge from the accumulator.

The curves are based on the following formula:

$$\Delta V = 0.855 \frac{V_0}{(P_2 \div P_1)^{1/n} - 1} \times f$$

Where:
- $\Delta V$ = volume of fluid discharged
- $V_0$ = Accumulator size
- $P_2$ = maximum system pressure
- $P_1$ = minimum system pressure
- $n$ = discharge coefficient
- $f$ = charge coefficient

It is assumed that the gas precharge pressure = 0.9 $P_1$.

Isothermal and Adiabatic Operation

In constructing the curves, the following factors have been assumed.

For isothermal operation eg: slow charge and discharge time, $f$ and $n = 1$

For adiabatic operation, eg: fast charge and discharge time, $f$ and $n = 1.8$

Note: The charts provide an estimate of the volume of accumulator required to store and release a given volume of fluid under specified conditions. In practice, the true charge and discharge coefficients will depend on the application, and may cause significant variations from the chart results. If in doubt, please contact our engineering department for a more detailed calculation.

Where the ratio $P_2 / P_1$ exceeds 1.9, a fatigue analysis is necessary. Please contact our engineering department for further information.

How to Use the Sizing Chart

These charts are used to find accumulator size $V_0$ when the required output $\Delta V$ is known.

Example

Refer to the red lines in the charts opposite.

$\Delta V = 6$ litres $P_2 = 170$ bar $P_1 = 100$ bar

Step 1

As the accumulator output $\Delta V$ is known, choose the appropriate pair of charts from the two sets shown opposite. For outputs up to 50 litres use charts A and B, and for outputs above 50 litres use charts C and D. In this case, as the required output is 6 litres, charts A and B should be used.

Step 2

Calculate $P_2 / P_1$ by dividing the maximum system pressure by the minimum pressure required to make the machine function.

In this case, $170 / 100 = 1.7$

Step 3

Using chart A, locate 1.7 on the X-axis and draw a vertical line to the top of the chart.

Step 4

Depending on the cycle time, select the appropriate curve on chart A. For fast cycle times, use the adiabatic curve; for slow cycle times, the isothermal curve should be used. In this case, use the adiabatic curve. ($n$ and $f = 1.8$)

Step 5

On chart A, identify the point at which the vertical line drawn in step 3 crosses the chosen curve (in this case adiabatic) and draw a horizontal line across to the right hand end of chart B.
**Sizing an Accumulator**

**Piston Accumulators**

**A Series**

---

**Step 6**
Using the lower X-axis on chart B, locate the required accumulator output (∆V), in this case 6 litres. Draw a vertical line to the top of the chart.

**Step 7**
Locate the point where the vertical line drawn in step 6 crosses the horizontal line drawn in step 5. Locate the first curve to the right of this intersection.

---

**Accumulator Sizing Chart ∆V = 0.1 to 50 Litres**

**Chart 1**

- Isothermal
- Adiabatic

**Chart 2**

- ∆V = 0.1 to 50 litres
- Vo Litres

**Chart 3**

- Isothermal
- Adiabatic

**Chart 4**

- ∆V Litres
- Vo Litres

---

**Step 8**
Follow the curve selected in step 7 up to the top X-axis (V0) and read off the required accumulator size, in this case 30 litres. Always round up to the next largest size available; for this example, therefore, a 38 litres accumulator should be selected.

**Summary**

- Pre-charge: 90% of 100 bar = 90 bar
- Adiabatic / Isothermal: Adiabatic
- Accumulator selected: A6ES2310L2K
Parker Worldwide

Europe, Middle East, Africa
AE – United Arab Emirates, Dubai
Tel: +971 4 8127100
parker.me@parker.com
AT – Austria, Wiener Neustadt
Tel: +43 (0)2622 23501-0
parker.austria@parker.com
AT – Eastern Europe, Wiener Neustadt
Tel: +43 (0)2622 23501 900
parker.easteurope@parker.com
AZ – Azerbaijan, Baku
Tel: +994 50 2233 458
parker.azerbaijan@parker.com
BE/LU – Belgium, Nivelles
Tel: +32 (0)67 280 900
parker.belgium@parker.com
BG – Bulgaria, Sofia
Tel: +359 2 980 1344
parker.bulgaria@parker.com
BY – Belarus, Minsk
Tel: +48 (0)22 573 24 00
parker.poland@parker.com
CH – Switzerland, Etoy
Tel: +41 (0)21 821 87 00
parker.switzerland@parker.com
CZ – Czech Republic, Klecany
Tel: +420 284 083 111
parker.czechrepublic@parker.com
DE – Germany, Kaarst
Tel: +49 (0)2131 4016 0
parker.germany@parker.com
DK – Denmark, Ballerup
Tel: +45 43 56 04 00
parker.denmark@parker.com
ES – Spain, Madrid
Tel: +34 902 330 001
parker.spain@parker.com
FI – Finland, Vantaa
Tel: +358 (0)20 753 2500
parker.finland@parker.com
FR – France, Contamine s’Arve
Tel: +33 (0)4 50 25 80 25
parker.france@parker.com
GR – Greece, Athens
Tel: +30 210 933 6450
parker.greece@parker.com
HU – Hungary, Budaörs
Tel: +36 23 885 470
parker.hungary@parker.com
IE – Ireland, Dublin
Tel: +353 (0)1 466 6370
parker.ireland@parker.com
IL – Israel
Tel: +972 4 50 19 21
parker.israel@parker.com
IT – Italy, Corsico (MI)
Tel: +39 02 45 19 21
parker.italy@parker.com
KZ – Kazakhstan, Almaty
Tel: +7 7273 561 000
parker.easteurope@parker.com
NL – The Netherlands, Oldenzaal
Tel: +31 (0)541 585 000
parker.nl@parker.com
NO – Norway, Asker
Tel: +47 66 75 34 00
parker.norway@parker.com
PL – Poland, Warsaw
Tel: +48 (0)22 573 24 00
parker.poland@parker.com
PT – Portugal
Tel: +351 22 999 7360
parker.portugal@parker.com
SE – Sweden, Spånga
Tel: +46 (08) 59 79 50 00
parker.sweden@parker.com
SK – Slovakia, Banská Bystrica
Tel: +421 484 162 252
parker.slovakia@parker.com
SL – Slovenia, Novo Mesto
Tel: +386 7 337 6650
parker.slovenia@parker.com
TR – Turkey, Istanbul
Tel: +90 216 4997081
parker.turkey@parker.com
UA – Ukraine, Kiev
Tel: +38 (0)222 573 24 00
parker.poland@parker.com
UK – United Kingdom, Warwick
Tel: +44 (0)1926 317 878
parker.uk@parker.com
ZA – South Africa, Kempton Park
Tel: +27 (0)11 961 0700
parker.southafrica@parker.com

North America
CA – Canada, Milton, Ontario
Tel: +1 905 693 3000
US – USA, Cleveland
Tel: +1 216 896 3000

Asia Pacific
AU – Australia, Castle Hill
Tel: +61 (0)2-9634 7777
CN – China, Shanghai
Tel: +86 21 2899 5000
HK – Hong Kong
Tel: +852 2428 8008
IN – India, Mumbai
Tel: +91 22 6513 7081-85
JP – Japan, Tokyo
Tel: +81 (0)3 6408 3901
KR – South Korea, Seoul
Tel: +82 2 559 0400
MY – Malaysia, Shah Alam
Tel: +60 3 7849 0800
NZ – New Zealand, Mt Wellington
Tel: +64 9 574 1744
SG – Singapore
Tel: +65 6887 6300
TH – Thailand, Bangkok
Tel: +662 186 7000
TW – Taiwan, Taipei
Tel: +886 2 2298 8987

South America
AR – Argentina, Buenos Aires
Tel: +54 3327 44 4129
BR – Brazil, Sao Jose dos Campos
Tel: +55 800 727 5374
CL – Chile, Santiago
Tel: +56 2 623 1216
MX – Mexico, Toluca
Tel: +52 72 2275 4200

EMEA Product Information Centre
Free phone: 00 800 27 27 5374
(from AT, BE, CH, CZ, DE, DK, EE, ES, FI, FR, IE, IL, IS, IT, LU, MT, NL, NO, PL, PT, RU, SE, SK, UK, ZA)

US Product Information Centre
Toll-free number: 1-800-27 27 537
www.parker.com

© 2016 Parker Hannifin Corporation. All rights reserved.