Position Indicating Switches
For Hydraulic and Pneumatic Cylinders
Our New and Exclusive – **ALS Switch**

Position Sensing with a Magnetic Piston and Standard Steel Tube!

Tie rod mounted switch available in both PNP and NPN outputs – See ALS Switch pages for details.

In line with our policy of continuing product improvement, specifications and information contained in this catalog are subject to change.

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<td>16</td>
</tr>
</tbody>
</table>
Choose the style that’s right for your needs –

Tie Rod Mounted Switches – actuated by a magnetic piston

- Can be positioned at any location along the cylinder to indicate end-of-stroke or mid-stroke locations.
- Allow multiple switches to be installed with numbers only restricted by available tie rod mounting space.
- Are non-intrusive and maintain pressure envelope integrity.
- Available for Series 2H in 1.50" - 6.00" bores. Series 3L and 2A in 1.00" - 4.00" bores.

Head or Cap Mounted Switch

Tie Rod Mounted Switch

Tie rod mounted switches are lower profile than head and cap mounted styles.

ALS Switch –
Innovative sensor exclusive to Parker detects a magnetic piston through a **standard steel tube**. They are an economical alternative to Global Switches for long stroke applications that require a stainless steel tube.

Global Solid State and Reed Switches –
Require a non-ferrous tube; stainless steel material in 2H and 3L maintain standard envelope pressure rating; aluminum tube in 3L offers economy with a reduction in envelope pressure rating (see Standard Specifications).

Head and Cap Mounted Switches

- Fixed mount design is actuated by proximity (without contact) of cushion sleeve or spear
- Provide an end-of-stroke signal with or without functional cushion
- Available up to 10.00" bore Series 2A and 8.00" bore Series 3L & 3H

EPS Inductive Switches –
Are suitable for general industrial as well as automotive applications requiring weld field immunity.

CLS Magnetic Principal Switches –
Are contact type switches with no leakage current and are better suited for series wiring, higher load current requirements and have higher temperature resistance.
Switches mounted on Parker hydraulic cylinders add value to your machine design

- Switches and cylinder combine to form a compact package
- Tie rod switches are easily adjustable along cylinder stroke length
- Low profile switches are less prone to mechanical damage

Magnetic Piston option for 1.50”-6.00” bore Series 2H and 1.00”-4.00” bore Series 3L cylinders

- Non-intrusive design eliminates the possibility of oil leakage
- Non-ferrous tube material for conventional solid state and reed switches
- Standard carbon steel tube for the ALS Switch

Series 2H and 3L Cylinder – with Hi-Load style magnetic piston

Durable polyurethane bi-directional seal – for positive sealing with no by-pass and long life.

WearGard™ wear band – improves resistance to bearing loads and provides support for magnet.

Cylinder Body – Standard carbon steel material for ALS Switch or 316 stainless steel for conventional solid state or reed switches. Aluminum material available in Series 3L.

Series 2A Cylinder – with Lipseal Magnetic Piston

Piston Lipseals – are self-compensating to conform to pressure and wear.

WearGard™ wear band – improves resistance to bearing loads and provides support for magnet.

Cylinder Body – Standard steel material for ALS Switch or 316 stainless steel or aluminum for conventional solid state or reed switches.
Model Ordering Code for Cylinders with Magnetic Piston

Specify – Piston Code ‘7’ when using ALS Switches
– Piston Codes ‘3’ or ‘A’ when using Reed or Solid State Switches

<table>
<thead>
<tr>
<th>2.00</th>
<th>C</th>
<th>BB</th>
<th>2H</th>
<th>3</th>
<th>T</th>
<th>1</th>
<th>A</th>
<th>C</th>
<th>12.00</th>
</tr>
</thead>
<tbody>
<tr>
<td>Bore Dia, in inches</td>
<td>Double Rod Cylinder</td>
<td>Series</td>
<td>Piston</td>
<td>Common Modifications</td>
<td>Piston Rod Number</td>
<td>Special Modification</td>
<td>Piston Rod Thread Style</td>
<td>Piston Rod Thread Type</td>
<td>Cushion Cap</td>
</tr>
<tr>
<td>1.00</td>
<td>1.50</td>
<td>2.00</td>
<td>2.50</td>
<td>3.25</td>
<td>4.00</td>
<td>5.00</td>
<td>6.00</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Specify:

- CB: Tie rods ext. head
- CD: Tie rods ext. cap
- CV: Tie rods extended at both ends
- JD: Head trunnion
- JB: Cap rectangular flange
- JH: Cap rectangular
- C: Side lugs
- F: Side tap
- BB: Cap fixed clevis
- D: Head trunnion
- DB: Cap trunnion
- DD: Intermediate fixed trunnion
- SB: Cap spherical bearing

Specify Models:

- T = SAE, Ports U = NPTF, Port R = BSP Ports
- Specify: 2H;
- 3L;
- 2A

Specify:

- T = SAE, Ports U = NPTF, Port R = BSP Ports
- Specify:
- 2H:
- 3L;
- 2A

Specify:

- T = SAE, Ports U = NPTF, Port R = BSP Ports
- Specify:
- 2H:
- 3L;
- 2A

Specify 4 = Small male
5 = Intermediate male
6 = Female
55 = Flange Coupler
3 = Special

Specify:

- V = Fluorocarbon²
- For select rod cylinders, select one only.

Maximum Pressure Rating for 3L Cylinder with Aluminum Tube

<table>
<thead>
<tr>
<th>Bore Ø (inches)</th>
<th>Pressure Rating (psi)²</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.00</td>
<td>1900</td>
</tr>
<tr>
<td>1.50</td>
<td>1500</td>
</tr>
<tr>
<td>2.00</td>
<td>1100</td>
</tr>
<tr>
<td>2.50</td>
<td>950</td>
</tr>
<tr>
<td>3.25</td>
<td>750</td>
</tr>
<tr>
<td>4.00</td>
<td>600</td>
</tr>
</tbody>
</table>

² When using Series 3L cylinders with aluminum bodies, do not introduce any shock or high inertia loading conditions. Pressure spikes must be avoided.

₃ Maximum pressure for aluminum tube in 2.50” bore with code 7 rod is 700 psi.

Standard Specifications

- Bore diameters – 1.00” to 6.00”. See table below for Series, Bore, and Piston availability.
- Strokes – up to 120” (Contact factory for longer strokes.)
- Piston rod diameters – 0.500” to 4.000”
- Temperature range – -10°F (-23°C) to +250°F (+121°C) (depending on seal class).
- Switch position may be restricted on mounting style DD.
- Working pressure – series and tube material dependent

2H & 2HD – 3000 psi with either carbon steel or stainless steel tube
3L – 1000 psi nominal (dependent on bore size) with either carbon steel or stainless steel tube; reduced pressure with aluminum tube per table.
2A – 250 psi regardless of tube material

Available Piston Code

<table>
<thead>
<tr>
<th>Bore Ø (inches)</th>
<th>2H Available Piston Code</th>
<th>3L Available Piston Code</th>
<th>2A Available Piston Code</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.00</td>
<td>None</td>
<td>3, A</td>
<td>3, A</td>
</tr>
<tr>
<td>1.50</td>
<td>3, 7</td>
<td>3, 7, A</td>
<td>3, 7, A</td>
</tr>
<tr>
<td>2.00</td>
<td>3, 7</td>
<td>3, 7, A</td>
<td>3, 7, A</td>
</tr>
<tr>
<td>2.50</td>
<td>3, 7</td>
<td>3, 7, A</td>
<td>3, 7, A</td>
</tr>
<tr>
<td>3.25</td>
<td>3, 7</td>
<td>3, 7, A</td>
<td>3, 7, A</td>
</tr>
<tr>
<td>4.00</td>
<td>3, 7</td>
<td>3, 7, A</td>
<td>3, 7, A</td>
</tr>
<tr>
<td>5.00</td>
<td>7</td>
<td>None</td>
<td>None</td>
</tr>
<tr>
<td>6.00</td>
<td>7</td>
<td>None</td>
<td>None</td>
</tr>
</tbody>
</table>

₈ Global Reed Switch cannot sense end of stroke on 1.00” bore. When positioned up against the head or cap approx. 0.200” stroke-to-go results after switch provides output. Global Solid State switch stroke-to-go is approx. 0.030”.

Shaded boxes identify required model number fields.

Note: See Model Number pages of individual series Parker Industrial Cylinder Product catalogs for additional options and limitations.

¹ See table below for Bore, Series, and Piston availability.
² Fluorocarbon seals for fluid compatibility only.
³ JJ mounting style not available in Series 2A
⁴ HH mounting style only available in Series 2H and 2HD
⁵ See ALS switch Part Numbers page for minimum stroke
Specifications

ALS Switch

- For magnetic piston sensing through steel tube material
- Cost effective alternative to stainless steel tube for longer strokes
- 4 wire DC connection

Switch Operation
The switch detects a change in polarity of the magnetic field as a piston with magnet moves through the cylinder.

Formatting
Before the switch is used for the first time, the piston with magnet should be run in and out of the cylinder to format the cylinder tube. The switch will detect the polarity of the residual magnetic field created by the movement of the magnetic piston during formatting.

Field Direction with Magnetic Piston
Single rod end cylinders are assembled with the piston magnet’s North Pole facing the rod end. As the magnetic piston moves through the cylinder, it creates a stronger field opposite in polarity to the residual magnetism in the cylinder tube. As it moves under the switch, the change in polarity of the magnetic field in the cylinder tube is detected.

Switch Zone
Switch actuation occurs as the piston enters a switching ‘zone’. The switching point is highly repeatable, in either direction, under conditions of constant piston speed and operating temperature.

ALS Switch output states may be influenced by an external magnetic field. Care must be taken to avoid external magnetic field exposure.

PNP and NPN versions can be wired N.O. or N.C.

The ALS Switch is not designed for use with non-ferrous tubes.

The switching zone may be up to 21mm wide depending on tube wall thickness and piston speed.

LED Indicators
There are two LED’s (yellow and red) to indicate that the piston is inside or outside the switching zone. The sequence of the LED’s is determined by the orientation of the north pole of the magnet system (rod end side of single rod end cylinders) to the connector.

When the ALS switch connector faces the rod side of single rod end cylinders the red LED turns ON when the piston is within the switching zone. The yellow LED is ON otherwise.

When the ALS switch connector faces the cap side of single rod end cylinders the yellow LED turns ON when the piston is within the switching zone. The red LED is ON otherwise.

Performance
Parker Industrial Cylinder Division ALS Switches have been designed to operate at a maximum piston speed of 0.5m/s, and a maximum cylinder operating temperature of 85°C.

<table>
<thead>
<tr>
<th>Specifications</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Switching Output:</td>
<td>PNP or NPN</td>
</tr>
<tr>
<td>Hysteresis1:</td>
<td>5mm</td>
</tr>
<tr>
<td>Repeatability1:</td>
<td>0.5mm</td>
</tr>
<tr>
<td>Load Current:</td>
<td>100mA</td>
</tr>
<tr>
<td>Leakage Current:</td>
<td>≤ 10µA</td>
</tr>
<tr>
<td>Voltage Drop:</td>
<td>≤ 1.5 VDC</td>
</tr>
<tr>
<td>Short Circuit and Overload Protection:</td>
<td>Yes</td>
</tr>
<tr>
<td>Reverse Polarity Protection:</td>
<td>Yes</td>
</tr>
<tr>
<td>Supply Voltage:</td>
<td>10 - 30 VDC</td>
</tr>
<tr>
<td>LED(s):</td>
<td>Yes (2)</td>
</tr>
<tr>
<td>Current Consumption:</td>
<td>≤ 30 mA</td>
</tr>
<tr>
<td>Operating Temperature Range:</td>
<td>-25°C to +85°C</td>
</tr>
<tr>
<td>Housing Material:</td>
<td>Black Polyamide (PA)</td>
</tr>
<tr>
<td>Enclosure Rating:</td>
<td>IP67</td>
</tr>
</tbody>
</table>

1Hysteresis and repeatability based on measurements with a cylinder outer diameter of 46mm, wall thickness of 3mm and piston speed of 0.5m/s.
ALS Switch

Because the ALS switch detects change in polarity as the magnet moves through the cylinder, wiring connections are dependent on switch mounting orientation to the magnet’s North Pole. The two possible orientations are:

A – connector facing toward the rod end (rod end 1 if K-type)
B – connector facing toward the cap end (rod end 2 if K-type)

Connections to Pin 1 (+VDC) and Pin 3 (-VDC) are the same for either switch orientation. But, as outlined in the table and wiring schematic diagrams below, the normal output state of Pins 2 & 4 flip between mounting orientations A & B. Note that to sense the fully retracted position of the cylinder the cap end switch must be mounted in orientation A, and to sense the fully extended position of the cylinder the rod end switch must be mounted in orientation B.

Switch Orientations

Example: An application requires that ALS switches sense the full retract and extend positions of the cylinder with normally closed logic at both ends. How would the switches be wired?

Answer: The two switches would not be installed or wired the same way. The cap end switch would be installed in orientation A with Pin 1 (+VDC), Pin 2 (Load), Pin 3 (-VDC), Pin 4 (not used). The rod end switch would be installed in orientation B with Pin 1 (+VDC), Pin 2 (not used), Pin 3 (-VDC), Pin 4 (Load).

LED Function and Pin Wiring

<table>
<thead>
<tr>
<th>Switch Mounting Orientation</th>
<th>Connector Facing Toward</th>
<th>LED indicator (on/off) when magnet is:</th>
<th>Pin</th>
<th>Wire</th>
<th>Function</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Single Rod Cylinder</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Double Rod Cylinder</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>A</td>
<td>Rod End</td>
<td>Out of Switch Zone</td>
<td>Red</td>
<td>Yellow</td>
<td>Red</td>
</tr>
<tr>
<td></td>
<td></td>
<td>in Switch Zone</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>Red</td>
<td>on</td>
<td>off</td>
<td>on</td>
</tr>
<tr>
<td>B</td>
<td>Cap End</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Rod End #2</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Switch Orientation A

Switch Orientation B

PNP Switch Orientation A

1 BROWN (+)
4 BLACK (-)
2 WHITE N.O.
3 BLUE N.C.

ALS Switch – Wiring Connection 12mm Connector

NPN Switch Orientation A

1 BROWN (+)
4 BLACK N.O.
2 WHITE (-)
3 BLUE N.C.
ALS Switch Part Numbers
All switches are packaged with tie rod mounting bracket and have a 4-pin male M12x1 threaded connector.

<table>
<thead>
<tr>
<th>Part Number</th>
<th>Switch Bracket Usage</th>
</tr>
</thead>
<tbody>
<tr>
<td>PNP</td>
<td>ALS-PL</td>
</tr>
<tr>
<td>NPN</td>
<td>ALS-NL</td>
</tr>
<tr>
<td>ALS-PH</td>
<td>ALS-NH</td>
</tr>
<tr>
<td>ALS-PHA</td>
<td>ALS-NHA</td>
</tr>
<tr>
<td></td>
<td>Series 3L &amp; 2A</td>
</tr>
<tr>
<td></td>
<td>1.50 – 4.00 Bore</td>
</tr>
<tr>
<td></td>
<td>Series 2H 1.50 – 4.00 Bore</td>
</tr>
<tr>
<td></td>
<td>Series 2H 5.00 - 6.00 Bore</td>
</tr>
</tbody>
</table>

Note: Specify piston code ‘7’ in cylinder model number when using ALS Switches.

Minimum Stroke for ALS Switch

<table>
<thead>
<tr>
<th>Bore Ø</th>
<th>3L &amp; 2A</th>
<th>2H</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.50</td>
<td>3.13</td>
<td>3.00</td>
</tr>
<tr>
<td>2.00</td>
<td>3.13</td>
<td>3.00</td>
</tr>
<tr>
<td>2.50</td>
<td>3.13</td>
<td>2.88</td>
</tr>
<tr>
<td>3.25</td>
<td>3.13</td>
<td>2.75</td>
</tr>
<tr>
<td>4.00</td>
<td>3.13</td>
<td>2.63</td>
</tr>
<tr>
<td>5.00</td>
<td>N/A</td>
<td>2.38</td>
</tr>
<tr>
<td>6.00</td>
<td>N/A</td>
<td>2.19</td>
</tr>
</tbody>
</table>

ALS Switches allow a .38 - .50 inch stroke-to-go piston travel for end-of-stroke mounting locations.

12mm Cordset for ALS Switches
12mm Cordset with Female Quick Connect

<table>
<thead>
<tr>
<th>M12 Straight Connector</th>
</tr>
</thead>
<tbody>
<tr>
<td>Cable Length</td>
</tr>
<tr>
<td>--------------</td>
</tr>
<tr>
<td>5 meters</td>
</tr>
<tr>
<td>2 meters</td>
</tr>
</tbody>
</table>

A female connector is available for all switches with the male 12mm quick connect option. The cordsets are available with a right angle or straight connector. Cordset part numbers are listed above.

Cordset Specifications

- Connector: Polyvinylchloride (PVC) body material, PVC contact carrier, spacing to VDE 0110 Group C, (250VAC / 300VDC)
- Contacts: Gold Plated Copper Tin (CuSn), stamped from stock.
- Coupling Method: Threaded nut: Chrome plated brass.
- Cord Construction: PVC non-wicking, non-hygroscopic, 250VAC / 300VDC. Cable end is stripped.
- Conductors: Extra high flex stranding with PVC insulation
- Temperature: -13°F to 158°F (-25°C to 70°C)
- Protection: NEMA 1, 3, 4, 6P and IEC 1P67
- Cable Length: 6.56 ft (2m) or 16.4 ft (5m)

<table>
<thead>
<tr>
<th>M12 Right Angle Connector</th>
</tr>
</thead>
<tbody>
<tr>
<td>Cable Length</td>
</tr>
<tr>
<td>--------------</td>
</tr>
<tr>
<td>5 meters</td>
</tr>
<tr>
<td>2 meters</td>
</tr>
</tbody>
</table>

CABLE LENGTH (m) (SEE TABLE)

Straight Connector

PIN 2 / WHT
PIN 3 / BLU
PIN 4 / BLK
PIN 1 / BRN

CABLE MINIMUM BEND RADIUS: 100mm

Right Angle Connector

PIN 2 / WHT
PIN 3 / BLU
PIN 4 / BLK
PIN 1 / BRN

CABLE LENGTH (SEE TABLE)
## Global Drop-In Solid State Switches

Global solid state switch outputs may be influenced by an external magnetic field. Care must be taken to avoid external magnetic field exposure.

### Specifications

<table>
<thead>
<tr>
<th>Specification</th>
<th>Standard PNP or NPN</th>
<th>ATEX Certified PNP</th>
<th>High Temperature PNP</th>
</tr>
</thead>
<tbody>
<tr>
<td>Type</td>
<td>Electronic</td>
<td>Electronic</td>
<td>Electronic</td>
</tr>
<tr>
<td>Output Function</td>
<td>Normally Open</td>
<td>Normally Open</td>
<td>Normally Open</td>
</tr>
<tr>
<td>Switch Output</td>
<td>PNP/NPN</td>
<td>PNP</td>
<td>PNP</td>
</tr>
<tr>
<td>Operating Voltage</td>
<td>10 - 30VDC</td>
<td>18 - 30VDC</td>
<td>10 - 30VDC</td>
</tr>
<tr>
<td>Continuous Current</td>
<td>100 mA max.</td>
<td>70 mA max.</td>
<td>200 mA max.</td>
</tr>
<tr>
<td>Magnetic Field Sensitivity</td>
<td>2.65 - 2.95mT</td>
<td>2.65 - 2.95mT</td>
<td>25 Gauss</td>
</tr>
<tr>
<td>Switching Frequency</td>
<td>5 kHz</td>
<td>1 kHz</td>
<td>10 KHz</td>
</tr>
<tr>
<td>Power Consumption</td>
<td>10 mA max.</td>
<td>10 mA max.</td>
<td>15 mA max.</td>
</tr>
<tr>
<td>Voltage Drop</td>
<td>2.2 VDC max.</td>
<td>2.2 VDC max.</td>
<td>3.1 VDC max.</td>
</tr>
<tr>
<td>Ripple</td>
<td>10% of Operating Voltage</td>
<td>10% of Operating Voltage</td>
<td>15% of Operating Voltage</td>
</tr>
<tr>
<td>Hysteresis</td>
<td>1.5 mm max.</td>
<td>1.5 mm max.</td>
<td>1.5 mm max.</td>
</tr>
<tr>
<td>Repeatability</td>
<td>0.1 mm max.</td>
<td>0.1 mm max.</td>
<td>0.1 mm max.</td>
</tr>
<tr>
<td>EMC</td>
<td>EN 60947-5-2</td>
<td>EN 60947-5-2</td>
<td>EN 60947-5-2</td>
</tr>
<tr>
<td>Short-circuit Protection</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
</tr>
<tr>
<td>Power-up Pulse Suppression</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
</tr>
<tr>
<td>Reverse Polarity Protection</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
</tr>
<tr>
<td>Enclosure Rating</td>
<td>IP67</td>
<td>IP68</td>
<td>IP67</td>
</tr>
<tr>
<td>Shock and Vibration Stress</td>
<td>30g, 11 ms, 10 to 55Hz, 1 mm</td>
<td>30g, 11 ms, 10 to 55Hz, 1 mm</td>
<td>30g, 11 ms, 10 to 55Hz, 1 mm</td>
</tr>
<tr>
<td>Operating Temperature Range</td>
<td>-25°C to +75°C (-13°F to +167°F)</td>
<td>-20°C to +45°C (-4°F to +113°F)</td>
<td>-25°C to +105°C (-13°F to +221°F)</td>
</tr>
<tr>
<td>Housing Material</td>
<td>PA 12 Black</td>
<td>PA 12 Black</td>
<td>Aluminum</td>
</tr>
<tr>
<td>Connector Cable</td>
<td>PUR</td>
<td>PVC</td>
<td>PUR</td>
</tr>
<tr>
<td>Connector</td>
<td>PUR</td>
<td>–</td>
<td>–</td>
</tr>
<tr>
<td>Approval for ATEX</td>
<td>–</td>
<td>–</td>
<td>–</td>
</tr>
</tbody>
</table>

### Solid State Switch – Wiring Connection

**Flying Lead or 8 mm Connector**

<table>
<thead>
<tr>
<th>Pin</th>
<th>Wire</th>
<th>Function</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Brown</td>
<td>Operating Voltage (+VDC)</td>
</tr>
<tr>
<td>4</td>
<td>Black</td>
<td>Output signal (N.O.)</td>
</tr>
<tr>
<td>3</td>
<td>Blue</td>
<td>-VDC</td>
</tr>
</tbody>
</table>

* ATEX switch is supplied with 2m Flying Leads.  
* High Temperature switch is not UL Listed.
Global Drop-In Reed Switches

<table>
<thead>
<tr>
<th>Wiring</th>
<th>Reed Switch</th>
</tr>
</thead>
<tbody>
<tr>
<td>3m Flying Leads</td>
<td>P8S-GRFAX</td>
</tr>
<tr>
<td>10m Flying Leads</td>
<td>P8S-GRFDX</td>
</tr>
<tr>
<td>0.3m Lead with 8mm Connector</td>
<td>P8S-GRCHX</td>
</tr>
</tbody>
</table>

Specifications
- Type: 2-Wire Reed
- Output Function: Normally Open
- Operating Voltage: 10 - 30 VDC
- Switching Power: 10 W
- Continuous Current: 100 mA max.
- Response Sensitivity: 2.1 - 3.4 mT
- Switching Frequency: 400 Hz
- Voltage Drop: 2.2 V max.
- Ripple: 10% of Operating Voltage
- Hysteresis: 1.5 mm max.
- Repeatability: 0.2 mm max.
- EMC: EN 60 947-5-2
- Reverse Polarity Protection: Yes
- Enclosure Rating: IP 67
- Connector Cable: PUR
- Connector: PUR

Global Reed Switch output may be influenced by external magnetic fields. Care must be taken to avoid external magnetic field exposure.

Circuit for Switching Contact Protection (Inductive Loads)

(Required for proper operation 24V DC)

Put Diode parallel to loads following polarity as shown below.

D: Diode—select a Diode with the breakdown voltage and current rating according to the load.

Typical Example—100 Volt, 1 Amp Diode
CR: Relay coil (under 0.5W coil rating)

Caution
- Use an ampmeter to test reed switch current. Testing devices such as incandescent light bulbs may subject the reed sensor to high in-rush loads.
- NOTE: When checking an unpowered reed switch for continuity with a digital ohmmeter the resistance reading will change from infinity to a very large resistance (2 M ohm) when the sensor is activated. This is due to the presence of a diode in the reed switch.
- Anti-magnetic shielding is recommended for reed switches exposed to high external RF or magnetic fields.
- The magnetic field strength of the piston magnet is designed to operate with our switches. Other manufacturers’ switches may not operate correctly in conjunction with these magnets.
- Use relay coils for reed switch contact protection.

(Recommended for longer life 120 VAC)

Put a resistor and capacitor in parallel with the load. Select the resistor and capacitor according to the load.

Typical Example—
CR: Relay coil (under 2W coil rating)
R: Resistor 1 KΩ - 5 KΩ, 1/4 W
C: Capacitor 0.1 F, 600 V

- The operation of some 120 VAC PLC’s (especially some older Allen-Bradley PLC’s) can overload the reed switch. The switch may fail to release after the piston magnet has passed. This problem may be corrected by the placement of a 700 to 1K OHM resistor between the switch and the PLC input terminal. Consult the manufacturer of the PLC for appropriate circuit.
- Switches with long wire leads (greater than 15 feet) can cause capacitance build-up and sticking will result. Attach a resistor in series with the reed switches (the resistor should be installed as close as possible to the switches). The resistor should be selected such that R (ohms) > E/0.3.
- Global reed switch outputs may be influenced by an external magnetic field. Care must be taken to avoid external magnetic field exposure.

Reed Switch – Wiring Connection

Flying Lead or 8 mm Connector

<table>
<thead>
<tr>
<th>Pin</th>
<th>Wire</th>
<th>Function</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Brown</td>
<td>Operating Voltage (+V)</td>
</tr>
<tr>
<td>4</td>
<td>Black</td>
<td>Not Used</td>
</tr>
<tr>
<td>3</td>
<td>Blue</td>
<td>Output Signal (-V or Ground)</td>
</tr>
</tbody>
</table>

wiring Reed Switch

3m Flying Leads P8S-GRFAX
10m Flying Leads P8S-GRFDX
0.3m Lead with 8mm Connector P8S-GRCHX
Tie Rod Bracket Assembly Part Number and Dimensions
Global switch bracket fits 1.00" - 4.00 bore cylinders. Global switches and bracket assemblies must be ordered separately.

Cordsets – 8mm Cordset for Global Switches
8mm Cordset with Female Quick Connect
A female connector is available for all sensors with the male 8mm quick connect option. The male plug will accept a snap-on or threaded connector. Cordset part numbers are listed below.

<table>
<thead>
<tr>
<th>Cable Length</th>
<th>Threaded Connector</th>
<th>Snap On Connector</th>
</tr>
</thead>
<tbody>
<tr>
<td>5 meters</td>
<td>086620T005</td>
<td>086620S005</td>
</tr>
<tr>
<td>2 meters</td>
<td>086620T002</td>
<td>086620S002</td>
</tr>
</tbody>
</table>

Cordset Specifications
Connector.................. Oil resistant polyurethane body material, PA 6 (Nylon) contact carrier, spacings to VDE 0110 Group C, (150 AC/DC)
Contacts.................. Gold plated beryllium copper, machined from solid stock
Coupling Method..... Snap-Lock or chrome plated brass nut
Cord Construction .. Oil resistant black PUR jacket, non-wicking, non-hygroscopic, 300V. Cable end is stripped and tinned.
Conductors.............. Extra high flex stranding, PVC insulation
Temperature............. -40 to 194°F (-40 to 90°C)
Protection............... NEMA 1, 3, 4, 6P and IEC 1P67
Cable Length............. 6.56 ft (2m) or 16.4 ft (5m)
**Dimensions / Connector Pin Wiring**

### EPS 7 & 6 Sensors
**Inductive Proximity**

![EPS 7 & 6 Sensors Diagram]

### CLS 1 & 4 Sensors
**Non-Contacting Magnetically Actuated**

![CLS 1 & 4 Sensors Diagram]

### Dimensions / Connector Pin Wiring

<table>
<thead>
<tr>
<th>Series</th>
<th>A max.</th>
<th>C max.</th>
</tr>
</thead>
<tbody>
<tr>
<td>2H</td>
<td>.86&quot;</td>
<td>1.75&quot;</td>
</tr>
<tr>
<td>3L</td>
<td>1.55&quot;</td>
<td>1.05&quot;</td>
</tr>
<tr>
<td>2A</td>
<td>1.55&quot;</td>
<td>1.30&quot;</td>
</tr>
<tr>
<td>HMI</td>
<td>1.19&quot;</td>
<td>1.05&quot;</td>
</tr>
</tbody>
</table>

### Connector Pin Numbering

**3-Pin Mini**

- Male Receptacle End View
- White: Load, Black: N.O., Green: L2 or L1 (AC 2 or DC 1)

**5-Pin Mini**

- Male Receptacle End View
- Black: Load Source, Red: N.O., Orange: Load Shk, White: (+)

### Series and Parallel Wiring

When Parker Industrial Cylinder EPS-6 or 7 proximity switches are used as inputs to programmable controllers, the preferred practice is to connect each switch to a separate input channel of the PLC. Series or parallel operations may then be accomplished by the internal PLC programming.

EPS-6 or 7 switches may be hard wired for series operation, but the voltage drop through the switches (see specifications) must not reduce the available voltage below what is needed to actuate the load.

EPS-6 or 7 switches may also be hard wired for parallel operation. However, the leakage current of each switch will pass through the load. The total of all leakage currents must not exceed the current required to actuate the load. When wiring EPS-6 sensors in parallel it is recommended that decoupling diodes be used.

### Minimum Stroke

The minimum stroke for EPS-6 or 7 and CLS-1 or 4 sensors, utilizing standard components, is the cushion sleeve or spear length for the cylinder series in which the sensor is installed. See the individual Industrial Cylinder series catalog for cushion length details. Contact the factory if a shorter stroke is required.
Hydraulic and Pneumatic Cylinders
Position Indicating Switches

Dimensions

CLS-2 Threaded Style Switches
Spacers are not required. Threaded switches can be adjusted for small changes to end of stroke position sensing.

As shown in the illustrations below, these switches are magnetically operated. Dual magnets provide a dependable "snap action" for positive position sensing.

In the “Unoperated” position, the magnet assembly is attracted in the opposite direction of the arrow, causing a finely ground stainless steel connecting rod to hold the contacts open.

In the “Operated” position a ferrous part (cushion or piston) enters the sensing area and attracts the magnet assembly which causes the rod to draw the contacts together.

<table>
<thead>
<tr>
<th>Bore Ø</th>
<th>HR Max.</th>
<th>HB Max</th>
<th>Bore Ø</th>
<th>HR Max.</th>
<th>HB Max</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.50</td>
<td>3.00</td>
<td>2.63</td>
<td>5.00</td>
<td>2.81</td>
<td>1.94</td>
</tr>
<tr>
<td>2.00</td>
<td>2.94</td>
<td>2.38</td>
<td>6.00</td>
<td>3.44</td>
<td>3.06</td>
</tr>
<tr>
<td>2.50</td>
<td>2.94</td>
<td>2.13</td>
<td>7.00</td>
<td>3.44</td>
<td>2.56</td>
</tr>
<tr>
<td>3.25</td>
<td>3.19</td>
<td>2.81</td>
<td>8.00</td>
<td>3.38</td>
<td>2.06</td>
</tr>
<tr>
<td>4.00</td>
<td>3.13</td>
<td>2.44</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

'Sense' bore not available in Series 3L

Switch Height – Series 3L & 2A

Switch Height – Series 2H

Switch Height – Series 2H

<table>
<thead>
<tr>
<th>Bore Ø</th>
<th>Rod Ø</th>
<th>HR</th>
<th>HB</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.50</td>
<td>0.625</td>
<td>2.56</td>
<td>3.31</td>
</tr>
<tr>
<td>1.000</td>
<td>2.75</td>
<td></td>
<td></td>
</tr>
<tr>
<td>2.00</td>
<td>1.000</td>
<td>2.56</td>
<td>2.69</td>
</tr>
<tr>
<td>1.375</td>
<td>2.69</td>
<td></td>
<td></td>
</tr>
<tr>
<td>2.50</td>
<td>1.750</td>
<td>2.94</td>
<td>2.69</td>
</tr>
<tr>
<td>1.750</td>
<td>2.94</td>
<td></td>
<td></td>
</tr>
<tr>
<td>3.25</td>
<td>1.750</td>
<td>2.94</td>
<td>2.56</td>
</tr>
<tr>
<td>1.750</td>
<td>2.94</td>
<td></td>
<td></td>
</tr>
<tr>
<td>4.00</td>
<td>2.000</td>
<td>3.06</td>
<td>2.44</td>
</tr>
<tr>
<td>2.500</td>
<td>2.50</td>
<td></td>
<td></td>
</tr>
<tr>
<td>5.00</td>
<td>2.000</td>
<td>2.38</td>
<td>2.31</td>
</tr>
<tr>
<td>2.500</td>
<td>2.38</td>
<td></td>
<td></td>
</tr>
<tr>
<td>6.00</td>
<td>3.000</td>
<td>3.38</td>
<td>3.00</td>
</tr>
<tr>
<td>3.000</td>
<td>3.38</td>
<td></td>
<td></td>
</tr>
<tr>
<td>7.00</td>
<td>3.500</td>
<td>3.13</td>
<td>2.69</td>
</tr>
<tr>
<td>5.000</td>
<td>3.13</td>
<td></td>
<td></td>
</tr>
<tr>
<td>8.00</td>
<td>4.000</td>
<td>3.13</td>
<td>2.25</td>
</tr>
<tr>
<td>4.500</td>
<td>3.13</td>
<td></td>
<td></td>
</tr>
<tr>
<td>5.000</td>
<td>2.50</td>
<td></td>
<td></td>
</tr>
<tr>
<td>5.500</td>
<td>2.69</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Operating Principle

Sensing gap: .030” to .060”

Trip point: Factory set with piston bottomed out.

Release point: Approx. .25” piston travel.

Minimum cylinder stroke is .50” on 1.50” & 2.00” bores; and .75” on 2.50” bore and larger.

See the CLS Specification table for additional details.
## Specifications – EPS Limit Switches

<table>
<thead>
<tr>
<th><strong>Switch Type:</strong></th>
<th>Inductive Proximity</th>
<th>Inductive Proximity</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Style:</strong></td>
<td>EPS-7</td>
<td>EPS-6</td>
</tr>
<tr>
<td><strong>Code Designator:</strong></td>
<td>H</td>
<td>D</td>
</tr>
</tbody>
</table>

### Description:
- **EPS-7**
  - Economical, General Purpose, 2 wire device, primarily for AC applications.
  - (Not suitable for 3 wire 24 volt Sinking or Sourcing applications.) Also for automotive industry applications.
- **EPS-6**
  - Economical General Purpose, 3 wire, DC sensor, dual output: sinking and sourcing.

<table>
<thead>
<tr>
<th><strong>Supply Voltage:</strong></th>
<th>20 to 250 VAC/DC</th>
<th>10 to 30 VDC</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Load Current, min.:</strong></td>
<td>8 mA</td>
<td>NA</td>
</tr>
<tr>
<td><strong>Load Current, max.:</strong></td>
<td>300 mA</td>
<td>200 mA</td>
</tr>
<tr>
<td><strong>Leakage Current:</strong></td>
<td>1.7 mA max.</td>
<td>10 micro amps max.</td>
</tr>
<tr>
<td><strong>Voltage Drop:</strong></td>
<td>7 V, max.</td>
<td>2 VDC max.</td>
</tr>
<tr>
<td><strong>Operating Temperature:</strong></td>
<td>-14° to +158° F</td>
<td>-14° to +158° F</td>
</tr>
<tr>
<td><strong>Switch Type:</strong></td>
<td>Inductive proximity</td>
<td>Inductive proximity</td>
</tr>
<tr>
<td><strong>Part Number:</strong></td>
<td>148897 _ _ _ _</td>
<td>148896 _ _ _ _</td>
</tr>
</tbody>
</table>

- **4 Digit Part Number Suffix:**
  - Add 4-digit part number suffix to indicate probe length:
    - 0125=1.25", 0206=2.06", 0288=2.875", 0456=4.562" |

- **Connection:**
  - 3 pin mini |
  - 5 pin mini |

- **Enclosure Rating:**
  - IEC IP67 |
  - IEC IP67 |

- **LED Indication:**
  - Yes |
  - Yes |

- **Weld Field Immunity:**
  - Yes |
  - Yes |

- **Output:**
  - 2 wire, Normally Open with leakage current |
  - Dual output: DC Sinking and DC Sourcing, user selectable via wiring |

- **Approvals/Marks:**
  - CE, UL, CSA |
  - CE, UL, CSA |

- **Make/Break Location:**
  - 0.13” from end of stroke, typical. Tolerance is +0/-0.13” |

### Wiring Instructions:
- **EPS-7**
  - Pin 1: AC Ground (Green)
  - Pin 2: Output (Black)
  - Pin 3: AC Line (White)
- **EPS-6**
  - Pin 1) +10 to 30 VDC (White)
  - Pin 2) Sourcing Output (Red)
  - Pin 3) Grounded (not connected or required)
  - Pin 4) Sinking Output (Orange)
  - Pin 5) DC Common (Black)

- **Standard Cable:**
  - 6’
  - 0853550006
  - 0853550012
  - 0875470006
  - 0859170006
  - 0859170012
- **Standard Cable:**
  - 12’
  - 0853550006
  - 0853550012
  - 0875470006
  - 0859170006
  - 0859170012
  - –
### Specifications – CLS Limit Switches

<table>
<thead>
<tr>
<th>Switch Type:</th>
<th>Non-Contacting Magnetically Actuated</th>
</tr>
</thead>
<tbody>
<tr>
<td>Style:</td>
<td>CLS-1</td>
</tr>
<tr>
<td>Code Designator:</td>
<td>F</td>
</tr>
</tbody>
</table>

#### Description:
- For applications where the customer needs NC contacts, zero leakage, zero voltage drop, higher or lower load current than EPS-style.
- For applications where the customer needs NC contacts, zero leakage, zero voltage drop, higher or lower load current than EPS-style.
- For applications where the customer needs NC contacts, zero leakage, zero voltage drop, higher or lower load current than EPS-style. Threaded style permits small adjustability of make/break location.

#### Supply Voltage:
- 24 to 240 VAC/DC

#### Load Current, min.:
- NA

#### Load Current, max.:
- 4 AMPS @ 120 VAC
- 3 AMPS @ 24 VDC

#### Leakage Current:
- None

#### Voltage Drop:
- None

#### Operating Temperature:
- -40° F to +221° F

#### Switch Type:
- Non-contacting magnetically actuated

#### Part Number:
- 148275
- 149109
- 117000, 117017, 117034

#### 4 Digit Part Number Suffix:
- Add 4-digit part number suffix to indicate probe length:
  - 0125=1.25”, 0206=2.06”, 0288=2.875”, 0456=4.562”

#### Connection:
- 3 pin mini
- 144” PTFE Coated Flying Leads with 1/2” conduit hub
- 36” Potted-in PVC cable (most sizes also with 1/2” conduit hub)

#### Enclosure Rating:
- NEMA 1, 2, 3, 4, 4X, 5, 6, 6P, 11, 12, 12K, 13

#### LED Indication:
- No

#### Short Circuit Protection:
- No

#### Weld Field Immunity:
- Yes

#### Output:
- SPDT (Single Pole Double Throw), Normally Open/Normally Closed, Form C

#### Approvals/Marks:
- UL or CSA¹

#### Make/Break Location:
- 0.13” from end of stroke, typical. Tolerance is +0/-.13”

#### Wiring Instructions:
- Pin 1: Common (Green)
- Pin 2: Normally Closed (Black)
- Pin 3: Normally Open (White)

#### Standard Cable:
- 6’
- 12’
- 6’, Right Angle

#### Standard Cable:
- 0853550006
- 0853550012
- 0875470006

---

¹ CSA available upon request – consult factory
How to Order EPS & CLS Limit Switches

Parker Industrial Cylinder EPS & CLS proximity switches may be ordered on Series 2A, 3L, 2H, 3H and HMI cylinders as follows:

1) Complete the basic model number
2) Place an “S” in the model number to denote switches and/or special features.
3) Mounting styles D, DB, JJ, J, and H should be used with caution because of possible mounting interferences.
4) Special modifications to cylinders other than switches must have a written description.

How to Specify EPS & CLS Switches

Parker Industrial Cylinder EPS & CLS proximity switches may be ordered on Series 2A, 3L, 2H, 3H and HMI cylinders as follows:

1) Complete the basic model number
2) Place an “S” in the model number to denote switches and/or special features.
3) Mounting styles D, DB, JJ, J, and H should be used with caution because of possible mounting interferences.
4) Special modifications to cylinders other than switches must have a written description.

5) Specify letter prefix “H” for EPS-7, “D” for EPS-6, “F” for CLS-1, “B” for CLS-4, or “G” for CLS-2, then fill in the four blanks specifying port location, switch orientation and actuation point for both head and cap. If only one switch is used, place “XXXX” in the unused blanks.

Example = H13AGG-XXXX denotes a switch on the head end only, EPS-7
Example = XXXX-B42AGG denotes a switch on the cap end only, CLS-4

### Head End

<table>
<thead>
<tr>
<th>H</th>
<th>1</th>
<th>3</th>
<th>A</th>
<th>GG</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Specify:</td>
<td>Switch</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>&quot;H&quot; = EPS-7</td>
<td>Location</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>&quot;D&quot; = EPS-6</td>
<td>See Figure 1</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>&quot;F&quot; = CLS-1</td>
<td>Location</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>&quot;B&quot; = CLS-4</td>
<td>See Figure 1</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>&quot;N&quot; = Prep for EPS-6 and EPS-7 switches</td>
<td>Location</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>&quot;P&quot; = Prep for CLS-1 and CLS-4 switches</td>
<td>Location</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>&quot;T&quot; = Prep for CLS-2 switch</td>
<td>Location</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

### Cap End

<table>
<thead>
<tr>
<th>H</th>
<th>4</th>
<th>2</th>
<th>A</th>
<th>GG</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Specify:</td>
<td>Switch</td>
<td></td>
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<td></td>
<td>&quot;H&quot; = EPS-7</td>
<td>Location</td>
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<td></td>
<td>&quot;D&quot; = EPS-6</td>
<td>See Figure 1</td>
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<tr>
<td></td>
<td>&quot;F&quot; = CLS-1</td>
<td>Location</td>
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<td></td>
<td>&quot;B&quot; = CLS-4</td>
<td>Location</td>
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<td></td>
<td>&quot;N&quot; = Prep for EPS-6 and EPS-7 switches</td>
<td>Location</td>
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<td>&quot;P&quot; = Prep for CLS-1 and CLS-4 switches</td>
<td>Location</td>
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<td></td>
<td>&quot;T&quot; = Prep for CLS-2 switch</td>
<td>Location</td>
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Note: All specified switch and port locations are as seen from rod end of cylinder.

1 CLS-1 and CLS-4 proximity switches are not available on the head end of 1.50" bore with 1.00" rod and 2.00" bore with 1.375" rod

---

**Figure 1**

**Figure 2**

Hydraulic and Pneumatic Cylinders
Position Indicating Switches
Offer of Sale

The items described in this document and other documents and descriptions provided by Parker Hannifin Corporation, its subsidiaries and its authorized distributors ("Seller") are hereby offered for sale at prices to be established by Seller. This offer and its acceptance are subject to all of the following Terms and Conditions. Buyer's order for any item described in its document, when communicated to Seller verbally, or in writing, shall constitute acceptance of this offer. All goods, services or products are referred to as "Products".

1. Terms and Conditions. Seller's willingness to offer Products, or accept an order for Products, is conditioned upon Buyer's acceptance of the following Terms and Conditions. Buyer's acceptance of these Terms and Conditions shall include each and every term of this offer.

2. Price Adjustments; Payments. Prices stated on Seller's quote or other documentation offered by Seller are valid for 30 days, and do not include any sales, use, or other taxes, levies, duties, assessments, or charges, unless otherwise specified by Seller. Unless otherwise specified by Seller, or upon any F.C.A. Seller's facility (INCOTERMS 2010). Payment is subject to credit approval and is due 30 days from the date of invoice or such other term as required by Buyer's Credit Department, at which time Buyer shall pay interest on any unpaid invoices at the rate of 1.5% per month or the maximum allowable rate under applicable law.

3. Delivery Dates; Title and Risk; Shipment. All delivery dates are approximate and Seller shall not be responsible for any damages resulting from any delay. Regardless of the method of shipment, title of the Products shall pass at the time of sale (or any other term as required by Seller's Credit Department, at which time Buyer shall pay interest on any unpaid invoices at the rate of 1.5% per month or the maximum allowable rate under applicable law).

4. Warranty. Seller warrants that the Products sold hereunder shall be free from defects in material or workmanship for a period of eighteen months from the date of delivery to Buyer. The prices charged for Seller's products are based upon the exclusions, limitations, and disclaimers set forth above, and upon the following disclaimer: Disk in NO EVENT SHALL SELLER BE 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 DAMAGES OR LOSS OF ANY KIND INCURRED WITHOUT SELLER'S WRITTEN CONSENT, EVEN IF SELLER HAS BEEN NEGLIGENT, WHETHER IN CONTRACT, TORT OR OTHER LEGAL THEORY. IN NO EVENT SHALL SELLER'S LIABILITY UNDER ANY CLAIM MADE BY BUYER EXCEED THE PURCHASE PRICE OF THE PRODUCTS.

5. User Responsibility. The user, through its own analysis and testing, is solely responsible for making the final selection of the system and Product and assuming all resulting liability. Buyer agrees to comply with all applicable laws and regulations, including both governmental and private, with respect to the subject matter and any other rules governing the use thereof. Buyer shall not make any payment or give anything of value, directly or indirectly to any governmental official, any foreign political office or official thereof, any candidate for any political office, or any representative of any foreign or domestic government or any foreign political office or official thereof, for the purpose of influencing in any way the purchase or sale of any Product. Buyer agrees to comply with all applicable laws and regulations, including both governmental and private, with respect to the subject matter and any other rules governing the use thereof. Buyer shall not make any payment or give anything of value, directly or indirectly to any governmental official, any foreign political office or official thereof, any candidate for any political office, or any representative of any foreign or domestic government or any foreign political office or official thereof, for the purpose of influencing in any way the purchase or sale of any Product.

6. Loss to Buyer's Property. Any designs, tools, patterns, data, drawings, confidential information or equipment furnished by Buyer or any other items which become Buyer's property, will be considered obsolete and may be destroyed by Seller after two consecutive years have elapsed without Buyer ordering the items manufactured using such property. Seller shall be held harmless for any loss or damage to such property, even if it is in Seller's possession or control.

7. Special Tooling. No tooling charge may be imposed for any special tooling, including without limitation, dies, fixtures, molds and patterns, acquired to manufacture any Product. Buyer must notify Seller of any special tooling, patterns, plans, drawings, or specifications furnished by Buyer to manufacture any Product; or Buyer's failure to comply with these terms and conditions. Seller shall not indemnify Buyer under any circumstance except as provided.

8. Cancellation and Changes. Orders shall not be subject to cancellation or change by Buyer 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. Seller may change product features, specifications, designs and availability with notice to Buyer.

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

10. Force Majeure. Seller does not assume the risk and shall not be liable for delay or failure to perform any of Seller's obligations hereunder in the event of circumstances beyond the reasonable control of Seller (hereinafter "Events of Force Majeure"). Events of Force Majeure shall include without limitation: accidents, strikes or labor disputes, acts of any government or government agency, acts of nature, delays or failures in delivery from carriers or suppliers, shortages of materials, or any other cause beyond Seller's reasonable control.

11. User and Severability. Failure to enforce any provision of this agreement will not waive that provision nor will any such failure prejudice Seller's right to enforce that provision in the future. Invalidation of any provision of this agreement by legislation or other rule of law shall not invalidate any other provision herein. The remaining provisions of this agreement will remain in full force and effect.

12. Governing Law. This agreement and the sale and delivery of all Products hereunder shall be deemed to have taken place in and shall be governed and construed in accordance with the laws of the State of Ohio, as applicable to contracts executed and wholly performed therein and without regard to conflicts of laws principles. Buyer irrevocably 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.

13. Indemnity for Infringement of Intellectual Property Rights. Seller shall have no liability for infringement of any patents, trademarks, copyrights, trade dress, trade names or other similar rights except as provided in this Section. Seller will defend at its expense and will pay the cost of any settlement or damages awarded in any action brought against Buyer based on an allegation that a Product sold pursuant to this Agreement infringes the Intellectual Property Rights of a third party. Seller's obligation to defend and indemnify Buyer is contingent on Buyer notifying Seller within ten (10) days of Seller's becoming 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 it infringes the Intellectual Property Rights of a third party, Seller may, at its sole expense and option, procure for Buyer the right to continue using the Product, replace or modify the Product so as to make it noninfringing, or offer to accept return of the Product and return the purchase price less a reasonable allowance for depreciation. Nonwithstanding the foregoing, Seller shall have no liability 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 shall constitute Seller's sole and exclusive liability and Buyer's sole and exclusive remedy for infringement of Intellectual Property Rights.

14. 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 herein merged.

15. Compliance with Law. U.K. Bribery Act and U.S. Foreign Corrupt Practices Act. Buyer agrees to comply with all applicable laws and regulations, including both governmental and private, with respect to the subject matter and any other rules governing the use thereof. Buyer shall not make any payment or give anything of value, directly or indirectly to any governmental official, any foreign political office or official thereof, any candidate for any political office, or any other person for the purpose of influencing in any way the purchase or sale of any Product.
Parker’s Motion & Control Technologies

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
- Aerospace
- Agriculture
- Bulk chemical handling
- Construction machinery
- Food & beverage
- Fuel & gas delivery
- Industrial machinery
- Mobile
- Oil & gas
- Transportation
- Welding

Key Products
- Brass fittings & valves
- Diagnostic equipment
- Fluid conveyance systems
- Industrial hose
- PTFE & PFA hose, tubing & plastic fittings
- Rubber & thermoplastic hose & couplings
- Tube fittings & adapters
- Quick disconnects

HYDRAULICS
Key Markets
- Aerospace
- Agriculture
- Construction machinery
- Food & beverage
- Fuel & gas delivery
- Industrial machinery
- Mobile
- Oil & gas
- Transportation
- Welding

Key Products
- Diagnostic equipment
- Hydraulic cylinders & accumulators
- Hydraulic motors & pumps
- Hydraulic systems
- Hydraulic valves & controls
- Power take-offs
- Rubber & thermoplastic hose & couplings
- Tube fittings & adapters
- Quick disconnects

PNEUMATICS
Key Markets
- Aerospace
- Agriculture
- Construction machinery
- Food & beverage
- Fuel & gas delivery
- Industrial machinery
- Mobile
- Oil & gas
- Transportation
- Welding

Key Products
- Air preparation
- Compact cylinders
- Field bus valve systems
- Grippers
- Guided cylinders
- Manifolds
- Miniature fluidics
- Pneumatic accessories
- Pneumatic actuators & grippers
- Pneumatic valves & controls
- Rodless cylinders
- Rotary actuators
- Tie rod cylinders
- Vacuum generators, cups & sensors

AEROSPACE
Key Markets
- Aircraft engines
- Business & general aviation
- Commercial transports
- Land-based weapons systems
- Military aircraft
- Missiles & launch vehicles
- Regional transports
- Unmanned aerial vehicles

Key Products
- Aircraft control systems & components
- Fluid conveyance systems
- Fluid metering delivery & atomization devices
- Fuel systems & components
- Hydraulic systems & components
- Inert nitrogen generating systems
- Pneumatic systems & components
- Wheels & brakes

CLIMATE CONTROL
Key Markets
- Agriculture
- Air conditioning
- Food, beverage & dairy
- Life sciences & medical
- Precision cooling
- Processing
- Transportation

Key Products
- CO2 controls
- Electronic controllers
- Filter dryers
- Hand shut-off valves
- Hose & fittings
- Pressure regulating valves
- Refrigerant distributors
- Safety relief valves
- Solenoid valves
- Thermostatic expansion valves

ELECTROMECHANICAL
Key Markets
- Aerospace
- Factory automation
- Food & beverage
- Life science & medical
- Machine tools
- Packaging machinery
- Paper machinery
- Plastics machinery & converting
- Primary metals
- Semiconductor & electronics
- Textile
- Wire & cable

Key Products
- AC/DC drives & systems
- Electric actuators
- Controllers
- Gantry robots
- Gearheads
- Human machine interfaces
- Industrial PCs
- Inverters
- Linear motors, slides & stages
- Precision stages
- Stepper motors
- Servo motors, drives & controls
- Structural extrusions

PROCESS CONTROL
Key Markets
- Chemical & refining
- Food, beverage & dairy
- Medical & dental
- Microelectronics
- Oil & gas
- Power generation

Key Products
- Analytical sample conditioning products & systems
- Fluoropolymer chemical delivery fittings, valves & pumps
- High purity gas delivery fittings, valves & regulators
- Instrumentation fittings, valves & regulators
- Medium pressure fittings & valves
- Process control manifolds

FILTRATION
Key Markets
- Aerospace
- Chemical processing
- Consumer
- Energy, oil & gas
- Fluid power
- General industrial
- Information technology
- Life sciences
- Military
- Semiconductors
- Telecommunications
- Transportation

Key Products
- Dynamic seals
- Elastomeric o-rings
- EMI shielding
- Extruded & precision-cut, fabricated elastomeric seals
- Homogeneous & inserted elastomeric shapes
- High temperature metal seals
- Metal & plastic retained composite seals
- Thermal management

Sealing & Shielding
Key Markets
- Aerospace
- Chemical processing
- Consumer
- Energy, oil & gas
- Fluid power
- General industrial
- Information technology
- Life sciences
- Military
- Semiconductors
- Telecommunications
- Transportation

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