INCREASE PRODUCTION • REDUCE MAINTENANCE • REDUCE DOWNTIME • REDUCE SCRAP

STRETCHING CYLINDERS
TRANSFER ARM HEADS
EJECT CYLINDERS
We understand your unique requirements

Focused on the specific needs of the plastic packaging industry, PHD offers many direct replacements for Sidel® and Krones® machines such as stretching cylinders, nozzle and needle cylinders, and transfer arms. PHD also provides the added benefit of unique designs. Our built-to-need designs address your specific application issues.

Our components are the actuators of choice. Designed for long life, PHD products keep your blow molding lines running while increasing productivity and reducing downtime and scrap.

We also offer the added benefit of our rebuild program which refurbishes your existing PHD components, enabling even longer service life and savings.

See page 12 for more information.

Krones® Replacement Reference Chart & Contents

<table>
<thead>
<tr>
<th>STRETCHING CYLINDERS WITH VALVE</th>
<th>PHD MODEL WITH VALVE</th>
<th>PAGE</th>
</tr>
</thead>
<tbody>
<tr>
<td>0-900-99-743-0</td>
<td>BCK1-5-50 x 390-DR-U23 or BCK1-5-50 x 390-DR-U19</td>
<td>3</td>
</tr>
<tr>
<td>0-902-52-569-9</td>
<td>BCK1-5-50 x 390-DR-U23 or BCK1-5-50 x 390-DR-U19</td>
<td>3</td>
</tr>
<tr>
<td>0-902-52-268-9</td>
<td>BCK2-5-50 x 390-DR-U23 or BCK2-5-50 x 390-DR-U19</td>
<td>3</td>
</tr>
<tr>
<td>0-901-85-956-4</td>
<td>BCK2-5-50 x 390-DR-U23 or BCK2-5-50 x 390-DR-U19</td>
<td>3</td>
</tr>
<tr>
<td>0-902-18-438-0</td>
<td>BCK2-5-50 x 390-DR-U23 or BCK2-5-50 x 390-DR-U19</td>
<td>3</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>NOZZLE CYLINDERS</th>
<th>PHD MODEL</th>
</tr>
</thead>
<tbody>
<tr>
<td>High-Pressure Nozzle Bell Seal</td>
<td>ML310864</td>
</tr>
<tr>
<td></td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>TRANSFER ARMS</th>
<th>PHD MODEL</th>
</tr>
</thead>
<tbody>
<tr>
<td>Transfer Arm Head</td>
<td>ML311628</td>
</tr>
<tr>
<td></td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>EJECT CYLINDERS</th>
<th>PHD MODEL</th>
</tr>
</thead>
<tbody>
<tr>
<td>25 mm Bore x 25 mm Stroke</td>
<td>ML310656</td>
</tr>
<tr>
<td></td>
<td></td>
</tr>
<tr>
<td>25 mm Bore x 8.5 mm Stroke</td>
<td>ML309880</td>
</tr>
<tr>
<td></td>
<td></td>
</tr>
</tbody>
</table>

PHD also offers replacement components for Sidel® machines

To request a free brochure, visit www.phdinc.com/resources/inforequest/
MAJOR BENEFITS

- Direct OEM replacement
- Single pressure operation
- ISO 2 valve compatible
- Retract cushion control factory set for retract end of stroke deceleration
- Cylinders easily field repairable to maximize investment
- Internal shock pads standard on extend and retract
- Food grade lubrication throughout
**ORDERING DATA: SERIES BCK STRETCHING CYLINDERS**

TO ORDER SPECIFY:
Product Line, Series, Type, OEM Cylinder No., Design No., Bore Size, Metric Stroke, Mandatory Option, and Cylinder Options if required.

**OEM CYLINDER NO.**
1 - Without retract lock
0-900-99-743-0 / 0-902-52-569-9
2 - With retract lock

**PRODUCT LINE**
B - Blow Mold

**TYPE**
K - Krones® Stretch Rod

**DESIGN NO.**
5 - Metric

**MANDATORY OPTION**
DR - Cushion Control Retract Only (Must be specified)

**SERIES**
C - Cylinder

150 psi [10 bar] Air

**BORE SIZE**

<table>
<thead>
<tr>
<th>BORE</th>
<th>AREA</th>
</tr>
</thead>
<tbody>
<tr>
<td>(mm)</td>
<td>(in) (sq mm) (sq in)</td>
</tr>
<tr>
<td>50</td>
<td>1.969 1963 3.05</td>
</tr>
</tbody>
</table>

Contact PHD for smaller or larger bores.

**METRIC STROKE**

<table>
<thead>
<tr>
<th>BORE SIZE</th>
<th>STANDARD STROKE LENGTHS</th>
</tr>
</thead>
<tbody>
<tr>
<td>(mm)</td>
<td>(mm)</td>
</tr>
<tr>
<td>50</td>
<td>390</td>
</tr>
</tbody>
</table>

(164 mm = Minimum Stroke in 1 mm Increments)
Contact PHD for longer strokes.

**CYLINDER OPTIONS**

- Extra Rod Extension in 1 mm increments
  - K5 = 5 mm, K17 = 17 mm, etc.
- MAC ISO 2 Series Valve with DIN Connector on Top*
- MAC ISO 2 Series Valve with DIN Connector Rotated 90°
- Rod Eye Attached to Rod End of Cylinder
- 16 mm incoming air line (12 mm standard)

6 wrench flats (2 wrench flats standard)*

*Recommended Option

NOTE: Standard stretching cylinder ordering number is as follows:
BCK1-5-50 x 390 - DR (-U19) -U23 or -U19. Options need to be specified for valve to be attached to unit.

**REMARKS:**

**TO ORDER SPECIFY:**
Product Line, Series, Type, OEM Cylinder No., Design No., Bore Size, Metric Stroke, Mandatory Option, and Cylinder Options if required.

**CONTACT:**
PHD for smaller or larger bores.

---

*Recommended Option

---

**Cylinde Options**

- Extra Rod Extension in 1 mm increments
- MAC ISO 2 Series Valve with DIN Connector on Top*
- MAC ISO 2 Series Valve with DIN Connector Rotated 90°
- Rod Eye Attached to Rod End of Cylinder
- 16 mm incoming air line (12 mm standard)

6 wrench flats (2 wrench flats standard)*

*Recommended Option
ENGINEERING DATA: SERIES BCK STRETCHING CYLINDERS

### ACTUATOR SPEEDS
Factory set on retract. Cam controlled velocity on extend by machine.

### MAXIMUM ALLOWABLE KINETIC ENERGY
Series BCK Cylinder is provided with a cushion retract. Its maximum kinetic energy rating is 60.5 in-lb [6.84 Nm].

### LIFE EXPECTANCY
Series BCK Cylinders have been designed for over 20 million trouble-free cycles.

### SCHEMATIC DIAGRAMS

**BCK1**

- VALVE: HOME = UP, SHIFT = DOWN
- ORIFICE: 2X MUFFLER
- CYLINDER
- MANIFOLD
- P1: 7 BAR
- P1: 7 BAR

**BCK2**

- VALVE: HOME = UP, SHIFT = DOWN
- ORIFICE: 2X MUFFLER
- CYLINDER
- MANIFOLD
- LOCKING CYLINDER
- P1: 7 BAR

---

**SPECIFICATIONS**

<table>
<thead>
<tr>
<th>IMPERIAL</th>
<th>METRIC</th>
</tr>
</thead>
<tbody>
<tr>
<td>TYPE</td>
<td>Pneumatic Cylinder</td>
</tr>
<tr>
<td>SERIES</td>
<td>BCK Stretch Rod Actuator</td>
</tr>
<tr>
<td>BORE SIZE</td>
<td>1.969 in</td>
</tr>
<tr>
<td>BORE AREA – EXTEND</td>
<td>3.04 in²</td>
</tr>
<tr>
<td>BORE AREA – RETRACT</td>
<td>2.56 in²</td>
</tr>
<tr>
<td>THEORETICAL OUTPUT @ 87 PSI [6 BAR]</td>
<td>264.5 lb</td>
</tr>
<tr>
<td>FLUID</td>
<td>Air</td>
</tr>
<tr>
<td>OPERATION</td>
<td>Double Acting</td>
</tr>
<tr>
<td>OPERATING PRESSURE RANGE</td>
<td>7.5 - 150 psi</td>
</tr>
<tr>
<td>AMBIENT AND FLUID TEMPERATURE</td>
<td>-20° to 180°F</td>
</tr>
<tr>
<td>OPERATING PISTON SPEED (TYPICAL)</td>
<td>Factory Set on Retract Cam Controlled on Machine</td>
</tr>
<tr>
<td>CUSHION, RETRACT</td>
<td>Standard (Factory Set)</td>
</tr>
<tr>
<td>LUBRICATION</td>
<td>FDA Regulation 21 CFR 1789.3570</td>
</tr>
<tr>
<td>PORT SIZE</td>
<td>G 1/4</td>
</tr>
<tr>
<td>STROKE</td>
<td>15.354 in</td>
</tr>
<tr>
<td>STROKE TOLERANCE</td>
<td>+.079/-0.000 in</td>
</tr>
<tr>
<td>BUMPER</td>
<td>Thermoplastic Polyester Elastomer</td>
</tr>
<tr>
<td>HEADS &amp; CAPS</td>
<td>Anodized Aluminum</td>
</tr>
<tr>
<td>CYLINDER TUBE</td>
<td>Anodized Aluminum</td>
</tr>
<tr>
<td>PISTON ROD</td>
<td>Hard Chrome Plated Steel</td>
</tr>
<tr>
<td>ROD BEARING</td>
<td>Engineered Polymer</td>
</tr>
<tr>
<td>PISTON &amp; ROD SEAL MATERIAL</td>
<td>Urethane</td>
</tr>
</tbody>
</table>

**VALVE SPECIFICATIONS**

<table>
<thead>
<tr>
<th>IMPERIAL</th>
<th>METRIC</th>
</tr>
</thead>
<tbody>
<tr>
<td>SERIES</td>
<td>ISO 2 (ISO 5599/1)</td>
</tr>
<tr>
<td>FUNCTION</td>
<td>5 / 2</td>
</tr>
<tr>
<td>FLUID</td>
<td>Air</td>
</tr>
<tr>
<td>OPERATOR</td>
<td>Single</td>
</tr>
<tr>
<td>PILOT</td>
<td>Internal</td>
</tr>
<tr>
<td>SPOOL RETURN</td>
<td>Air Only</td>
</tr>
<tr>
<td>SOLENOID</td>
<td>24 Vdc (5.4 W)</td>
</tr>
<tr>
<td>VOLTAGE RANGE</td>
<td>-15% to +10% from Nominal</td>
</tr>
<tr>
<td>ELECTRICAL CONNECTOR</td>
<td>DIN 43650, Form A</td>
</tr>
<tr>
<td>MANUAL OPERATOR</td>
<td>Non-locking Recessed</td>
</tr>
<tr>
<td>PILOT EXHAUST</td>
<td>Muffled</td>
</tr>
<tr>
<td>FLOW</td>
<td>3.0 Cv</td>
</tr>
<tr>
<td>LUBRICATION</td>
<td>FDA Regulation 21 CFR 1789.3570</td>
</tr>
<tr>
<td>FILTRATION</td>
<td>40 Micron</td>
</tr>
<tr>
<td>OPERATING PRESSURE RANGE</td>
<td>20 to 150 psi</td>
</tr>
<tr>
<td>AMBIENT AND FLUID TEMPERATURE</td>
<td>0° to 120°F</td>
</tr>
</tbody>
</table>

**LUBRICATION**
Series BCK Cylinders are lubricated internally at the factory for the life of the cylinder. PHD uses FDA food grade lubrication per regulation 21 CFR 1789.3570. Any other lubrication applied to the cylinder may decrease the life expectancy.

**MAINTENANCE**
As with most PHD products, these cylinders are field repairable. Repair kits, piston and rod assemblies, and main structural components are available as needed for extended service.
**DIMENSIONS: SERIES BCK STRETCHING CYLINDERS**

**BCK1**

Refer to BCK1 Cylinder above for all other dimensions not shown.

**NOTES:**
1) UNIT SHOWN AT 390 mm TRAVEL
2) DIMENSIONS IN [ ] INDICATE VALUES IN mm
3) MAXIMUM STROKE IS 15.354 [390]
4) MINIMUM STROKE IS 6.457 [164]
5) FOR STROKES SHORTER THAN 390 SUBTRACT .019 [.5 mm] FOR EACH 1 mm OF STROKE REDUCTION.

**CAUTION:** *A tamper evident tag is placed over the cushion control needle cavity. Removal of the tag and/or adjustment of the cushion needle will void the warranty of the Series BCK Cylinder.*

**BCK2**

Refer to BCK1 Cylinder above for all other dimensions not shown.

**NOTES:**
1) UNIT SHOWN AT 390 mm TRAVEL
2) DIMENSIONS IN [ ] INDICATE VALUES IN mm
3) MAXIMUM STROKE IS 15.354 [390]
4) MINIMUM STROKE IS 6.457 [164]

**CAUTION:** *A tamper evident tag is placed over the cushion control needle cavity. Removal of the tag and/or adjustment of the cushion needle will void the warranty of the Series BCK Cylinder.*

All dimensions are reference only unless specifically tolerated.

[www.phdinc.com/bck]  (800) 624-8511
OPTIONS: SERIES BCK STRETCHING CYLINDERS

U19 MAC ISO 2 SERIES VALVE
TOP ORIENTED DIN CONNECTION

A MAC ISO 2 Series valve is optionally provided and assembled to the unit by specifying the -U19 option. The valve is equipped with a top oriented DIN 43650, shape A connector, and is lubricated with FDA Regulation 21 CFR 1789.3570 food grade lubrication. Refer to valve specification chart on page 5.

NOTES:
1) UNIT SHOWN AT 390 mm TRAVEL
2) DIMENSIONS IN [ ] INDICATE VALUES IN mm
3) MAXIMUM STROKE IS 15.354 [390]
4) MINIMUM STROKE IS 6.457 [164]
5) FOR STROKES SHORTER THAN 390 SUBTRACT .019 [.5 mm]
   FOR EACH 1 mm OF STROKE REDUCTION.

-Recommended Option-

U23 MAC ISO 2 SERIES VALVE
SIDE ORIENTED DIN CONNECTION
(OEM ORIENTATION)

A MAC ISO 2 Series valve with side oriented DIN connection is an option and assembled to the unit by specifying the -U23 option. The valve is equipped with a DIN 43650, shape A connector, and is lubricated with FDA Regulation 21 CFR 1789.3570 food grade lubrication. Refer to valve specification chart on page 5.

NOTES:
1) UNIT SHOWN AT 390 mm TRAVEL
2) DIMENSIONS IN [ ] INDICATE VALUES IN mm
3) MAXIMUM STROKE IS 15.354 [390]
4) MINIMUM STROKE IS 6.457 [164]
5) FOR STROKES SHORTER THAN 390 SUBTRACT .019 [.5 mm]
   FOR EACH 1 mm OF STROKE REDUCTION.

!! CAUTION: !! When attaching the -U23 Option to the cylinder manifold, the two M3 SHCS holding the pilot block to the valve body must be removed in order to properly attach the valve to the manifold. If the M6 SHCS are not properly torqued, the valve may leak and the SHCS will damage both the pilot block and the valve body.

K_ EXTRA ROD EXTENSION

Extra rod extension can be achieved by specifying the option -K followed by the length code. Rod extension is available in 1 mm increments. Contact PHD for other combinations.

NOTES:
1) -K_ = EXTRA ROD EXTENSION IN 1 MM INCREMENT LENGTHS
   CODE EXAMPLES: -K5 = 5 MM EXTENSION
   -K15 = 15 MM EXTENSION
2) ROD EXTENSION SHOWN AT -K15 (15MM)

All dimensions are reference only unless specifically tolerated.

www.phdinc.com/bck  •  (800) 624-8511
R13  **ROD EYE MOUNTING WITH SPHERICAL BEARING (DIN 8139)**

This option includes a rod eye attached to the rod end of the cylinder.

L2116  **16 mm INCOMING AIR FITTING**

This option provides connection for 16 mm incoming air lines.

F66  **6 WRENCH FLATS**

Extra wrench flats can be achieved by specifying this option. Contact PHD for other possible rod end configurations.

---

All dimensions are reference only unless specifically tolerated.

www.phdinc.com/bck  •  (800) 624-8511
**PARTS LIST & REPAIR KITS: SERIES BCK STRETCHING CYLINDERS**

**PARTS LIST**

**BCK1 PART DESCRIPTION**

- **Finished Tube**
- **Head Assembly**
- **Head**
- **Rod Bushing**
- **Rod Seal**
- **Retaining Ring**

**BCK2 PART DESCRIPTION**

- **Cap Assembly**
- **Cap Mounting Plate**
- **Piston & Rod Assembly**
- **Flat Head Cap Screw**
- **Socket Head Cap Screw**

**NOTE:**
1. A tamper evident tag is placed over the cushion control needle cavity. Removal of the tag and/or adjustment of the cushion needle will void the warranty of the cylinder.
2. **CAUTION:** When attaching the -U23 option to the cylinder manifold (21), the two M6 SHCS that hold the pilot block to the valve body must be removed in order to properly attach the valve to the manifold. If the M6 SHCS are not properly torqued, the valve may leak and the SHCS will damage both the pilot block and the valve body.

---

**NOTES:**

- **Seal Kit:**
- **Repair Kit:**

**KEY PART DESCRIPTION**

**KEY OPTION PART DESCRIPTION**

- **Seal Kit (Main Cylinder Only):**
- **Repair Kit (Main Cylinder Only):**

**BCK1 & BCK2 PART DESCRIPTION**

<table>
<thead>
<tr>
<th>NUMBER</th>
<th>PART DESCRIPTION</th>
<th>COLOR CODE</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Finished Tube</td>
<td></td>
</tr>
<tr>
<td>2</td>
<td>Head Assembly</td>
<td></td>
</tr>
<tr>
<td>2A</td>
<td>Head</td>
<td></td>
</tr>
<tr>
<td>2B</td>
<td>Rod Bushing</td>
<td></td>
</tr>
<tr>
<td>2C</td>
<td>Rod Seal</td>
<td></td>
</tr>
<tr>
<td>2D</td>
<td>Retaining Ring</td>
<td></td>
</tr>
</tbody>
</table>

**NOTE:**
- **Seal Kit:**
- **Repair Kit:**

---

**BCK2 PART DESCRIPTION**

<table>
<thead>
<tr>
<th>NUMBER</th>
<th>PART DESCRIPTION</th>
<th>COLOR CODE</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Cap Mounting Plate</td>
<td></td>
</tr>
<tr>
<td>2</td>
<td>Piston &amp; Rod Assembly</td>
<td></td>
</tr>
<tr>
<td>2A</td>
<td>Piston</td>
<td></td>
</tr>
<tr>
<td>2B</td>
<td>Flat Head Cap Screw</td>
<td></td>
</tr>
<tr>
<td>2C</td>
<td>Body Assembly</td>
<td></td>
</tr>
<tr>
<td>2D</td>
<td>Body</td>
<td></td>
</tr>
<tr>
<td>2E</td>
<td>Piston Seal</td>
<td></td>
</tr>
<tr>
<td>2F</td>
<td>Retaining Ring</td>
<td></td>
</tr>
</tbody>
</table>

**KEY OPTION PART DESCRIPTION**

- **Seal Kit:**
- **Repair Kit:**

---

**NOTES:**

1. **A tamper evident tag is placed over the cushion control needle cavity. Removal of the tag and/or adjustment of the cushion needle will void the warranty of the cylinder.**
2. **CAUTION:** When attaching the -U23 option to the cylinder manifold (21), the two M6 SHCS that hold the pilot block to the valve body must be removed in order to properly attach the valve to the manifold. If the M6 SHCS are not properly torqued, the valve may leak and the SHCS will damage both the pilot block and the valve body.
High Pressure Nozzle Bell Seal

**ML310864**

**MAJOR BENEFITS**
- FDA material
- Longer life than OEM solution

Transfer Arm Head

**ML311628**

**MAJOR BENEFITS**
- Hardened tool steel body
- Lubrication ports provided
- Longer life than OEM solution

All dimensions are reference only unless specifically tolerated.

www.phdinc.com • (800) 624-8511
Eject Cylinder

**ML309880 (25x8.5)**
**ML310656 (25x25)**

**MAJOR BENEFITS**

- Provides rapid repeatable ejection function due to MAC valve design and PHD cylinder.
- High kinetic energy capacity
- Provides faster delivery times than OEM product
- In many cases lower cost solution than OEM product
- Intended for high speed part rejection

**VALVE INTERFACE AREA DETAIL**

- CYL B PORT (RETRACT)
- CYL A PORT (EXTEND)
- EXHAUST B PORT
- INLET PORT

**MAC VALVE PER 46A-N00-JXX0-1KJ** (VALVE SHOWN FOR REFERENCE ONLY - TO BE SUPPLIED AND INSTALLED BY DISTRIBUTOR)

**NOTE:** UNIT TO ACCEPT SERIES 46 BASE MOUNT MAC VALVE PER MAC PART# 46A-N00-JXX0-1KJ.

All dimensions are reference only unless specifically tolerated.

www.phdinc.com  •  (800) 624-8511
Rebuild Program

Get a 12 Month “Like New” Warranty

Plastic Packaging Components such as Stretching Cylinders, Transfer Arms, Blow Nozzles, Filler Cylinders, Slip Sheet Grippers, and Eject Slides are rebuildable.

PHD’s Rebuild Program refurbishes your existing PHD products with all new wear items.

Rebuilt units offer the same PHD quality that you’re used to, but for a fraction of the cost of a new unit, reducing your total cost of ownership.

Rebuilt units are placed back into service, thus reducing your total cost and saving valuable components from scrap.

All PHD factory rebuilt units receive a 12 month “like new” warranty.

UNIQUE SOLUTIONS® SPECIAL REQUIREMENTS

PHD Unlimited Unique Solutions® designs and manufactures units to meet the special requirements of our customers. We welcome and encourage requests for specialized products, regardless of quantity or frequency of order. Our solutions range from one-time-only units to high quantity requirements. With over 30,000 designs and over 100,000 quotes already in our database, we can provide most quotes within eight working hours. When it comes to delivery, PHD is the best. Give us a call or go online and see how we can become your engineering partner.

www.phdinc.com/unlimited/quote

To request a free brochure, visit www.phdinc.com/resources/inforequest/

Capabilities

- Most quotes delivered within eight working hours
- Dedicated application assistance
- 24 hours a day, 7 days a week service
- Fast delivery and competitive pricing
- Separate unique solutions engineering and manufacturing areas dedicated to our customers, ensuring prompt quotes and dependable delivery
- Over 30,000 unique solutions provided and over 100,000 quotes in our database