Magnetically Coupled Rodless Cylinder

Series NCY3B

Upgraded version of space saving magnetically coupled rodless cylinder

Basic type
Improved durability

**Improved bearing performance**
A 70% longer wear ring length achieving an improvement in bearing performance compared to the NCY2B.

**Improved lubrication by using a lubretainer**
A special resin lubretainer is installed on the dust seal to achieve ideal lubrication on the external surface of the cylinder tube.

Mounting dimensions are identical to those of the NCY2B series.

The mounting dimensions (in the drawing below) are identical with those of existing NCY2B series, allowing easy replacement.

(*) For bore size of ø6(1/4"), the mounting is not directly interchangeable with the NCY2B series because the piping port has been reduced to a M3 size.

**Series NCY3B**
- Nine bore sizes ranging from 6 mm (1/4") to 63 mm (2-1/2") are available.
- Broad range of made-to-order options.

Note) When ordering a product that is interchangeable with a NCY2B6, add the suffix, X1468 to the end of the NCY3B6 model number (Refer to page 12).
Upgraded version of space saving magnetically rodless cylinder!

Reduction of sliding resistance

Minimum operating pressure reduced by 30%

By using a lubretainer, the minimum operating pressure is reduced by 30%.
(NCY3B40 compared with the NCY2B40)

Lubretainer (special resin)

Wear ring A

Wear ring B

Series NCY3B

Lightweight

The body weight has been reduced by approximately 10% by eliminating unnecessary body weight and by reducing the outer diameter of the cylinder tube. (Compared with previous ø50(2”) and ø63(2-1/2”) models)

Minimum operating pressure reduced by 30%

By using a lubretainer, the minimum operating pressure is reduced by 30%.
(NCY3B40 compared with the NCY2B40)

Series variations

<table>
<thead>
<tr>
<th>Bore size</th>
<th>Standard stroke (inch)</th>
<th>Max. available stroke (inch)</th>
</tr>
</thead>
<tbody>
<tr>
<td>ø6(1/4”)</td>
<td>2 3 4 5 6 10 15 20 25 30 40</td>
<td>12 20 40 60 80</td>
</tr>
<tr>
<td>ø10(3/8”)</td>
<td>2 3 4 5 6 10 15 20 25 30 40</td>
<td>20 40 60 80</td>
</tr>
<tr>
<td>ø15(5/8”)</td>
<td>2 3 4 5 6 10 15 20 25 30 40</td>
<td>20 40 60 80</td>
</tr>
<tr>
<td>ø20(3/4”)</td>
<td>2 3 4 5 6 10 15 20 25 30 40</td>
<td>20 40 60 80</td>
</tr>
<tr>
<td>ø25(1”)</td>
<td>2 3 4 5 6 10 15 20 25 30 40</td>
<td>20 40 60 80</td>
</tr>
<tr>
<td>ø32(1-1/4”)</td>
<td>2 3 4 5 6 10 15 20 25 30 40</td>
<td>20 40 60 80</td>
</tr>
<tr>
<td>ø40(1-1/2”)</td>
<td>2 3 4 5 6 10 15 20 25 30 40</td>
<td>20 40 60 80</td>
</tr>
<tr>
<td>ø50(2”)</td>
<td>2 3 4 5 6 10 15 20 25 30 40</td>
<td>20 40 60 80</td>
</tr>
<tr>
<td>ø63(2-1/2”)</td>
<td>2 3 4 5 6 10 15 20 25 30 40</td>
<td>20 40 60 80</td>
</tr>
</tbody>
</table>

Made to Order

- Heat resistant specification (XB6)
- Low speed specification (0.6 to 2.0 inch/s) (XB9)
- Low speed specification (0.3 to 2.0 inch/s) (XB13)
- Air Hydro specification (X116)
- Axial ports (X132)
- High speed specification (X160)
- Helical insert thread specification (X168)
- Added mounting tap positions for slider (X206)
- Oil-free exterior specification (X210)
- Outside of cylinder tube with hard chrome plating (X322)
- Oil-free exterior specification (with dust seal) (X324)
- Interchangeable specification with NCY2B6 (X1468)
- With magnetic shielding plate (XC24)
- With floating joint (XC57)

Note) The mark indicates the available combination of bore size and standard stroke.

Availability of made-to-order products varies with the series and the bore size. For more information, please refer to page 9.
**Series NCY3B**

**Model Selection Criteria**

<table>
<thead>
<tr>
<th>Model selection point</th>
<th>Recommended cylinder</th>
</tr>
</thead>
<tbody>
<tr>
<td>Non-integrated guide type</td>
<td>A long stroke is possible.</td>
</tr>
</tbody>
</table>

- When used with many different types of guides.
- When a long stroke is necessary.

### E: Kinetic energy of load (J)

\[ E = \frac{(W + W_b)}{2} \times V^2 \times 2.2 \times 39.4 \]

- \( E_s \): Allowable kinetic energy for intermediate stop using an air pressure circuit (J)
- \( F_n \): Allowable driving force (lbf)
- \( P_s \): Operating pressure limit for intermediate stop using an external stopper, etc. (PSI)
- \( P_v \): Maximum operating pressure for vertical operation (PSI)
- \( W_{b_{\text{max}}} \): Maximum load weight (lbf) when loaded directly on the body
- \( W_v \): Allowable load weight for vertical operation (lbf)
- \( \mu \): Guide's coefficient of friction
- \( L_o \): Distance from cylinder shaft center to workpiece point of application (inch)
- \( L_s \): Distance from cylinder shaft center to connection fitting, etc.

### Operating conditions

- \( W \): Load weight (lbf)
- \( W_s \): Connection bracket weight (lbf)
- \( V \): Guide’s coefficient of friction
- \( L_o \): Distance from cylinder shaft center to workpiece point of application (inch)
- \( L_s \): Distance from cylinder shaft center to connection fitting, etc.

### Model Selection

- **Horizontal operation**
- **Inclined operation**
- **Vertical operation**

### Operating pressure

\[ W + W_b \leq P \leq P_v \]

**First tentative bore size determination**

\[ \phi D \geq 1.6 \times F_1 \]

- \( F_1 = \mu \times (W + W_b) \times (\mu \times \text{swag}) \)

**Second tentative bore size determination**

\[ \phi D \geq 1.6 \times F_3 \]

- \( F_3 = (W + W_b) \times (\mu + 1) \)

### Connection bracket weight

**Determination of allowable load weight & pressure**

\[ W_s \leq W_{b_{\text{max}}} \]

### Intermediate stop?

- **Yes**
- **No**

**Intermediate stopping method**

- Stop with external stopper
- Stop with air pressure circuit

**Bore size determination**

\[ E = \frac{(W + W_b)}{2} \times V^2 \times 2.2 \times P \leq P_s \]

**Review of order made products based on operating conditions**

\[ E > E_s \]

**Review of larger bore size**

### Note 1)

This cylinder cannot perform an intermediate stop using an air pressure circuit in vertical operation. In this case, an intermediate stop can be performed only by using an external stopper, etc.

### Note 2)

Depending on the operating environment, etc., made-to-order products should also be reviewed.
Selection Procedure

**Selection procedure**
1. Find the drive resisting force \( F_n \) (lbf) when moving the load horizontally.
2. Find the distance \( L_o \) (inch) from the point of the load where driving force is applied, to the center of the cylinder shaft.
3. Select the bore size from \( L_o \) and \( F_n \) based on data A.

**Selection example**

Given a load drive resisting force of \( F_n = 20 \) (lbf) and a distance from the cylinder shaft center to the load application point of \( L_o = 3 \) inch find the intersection point by extending upward from the horizontal axis of data A, where the distance from the shaft center is 3 inch, and then extending to the side, find the allowable driving force on the vertical axis.

Models suitable in satisfying the requirement of 20 (lbf) are **NCY3B32** or **NCY3B40**.

* The point of the distance \( L_o \) from the center of the cylinder shaft indicates the moment point of the cylinder and the load section.
Series NCY3B

Model Selection

Precautions on Design 2

Cylinder Dead Weight Deflection

When the cylinder is mounted horizontally, deflection appears due to its own weight as shown in the data, and the longer the stroke is, the greater the amount of variation in the shaft center. Therefore, a connection method should be considered which can assimilate this deflection.

Vertical Operation

The load should be guided by a ball type bearing (linear guide, etc.). If a slide bearing is used, sliding resistance increases due to the load weight and load moment, which can cause malfunction.

Max. Weight of Connection Bracket to the Body

The NCY3B series is guided by an external axis (such as a linear guide) without directly mounting the load. When designing a metal bracket to connect the load, see to it that its weight will not exceed the value in the table below.

<table>
<thead>
<tr>
<th>Model</th>
<th>Max. connection bracket weight Wbmax (oz)</th>
</tr>
</thead>
<tbody>
<tr>
<td>NCY3B6</td>
<td>7.1</td>
</tr>
<tr>
<td>NCY3B10</td>
<td>14.1</td>
</tr>
<tr>
<td>NCY3B15</td>
<td>35.3</td>
</tr>
<tr>
<td>NCY3B20</td>
<td>38.8</td>
</tr>
<tr>
<td>NCY3B25</td>
<td>42.3</td>
</tr>
<tr>
<td>NCY3B32</td>
<td>52.9</td>
</tr>
<tr>
<td>NCY3B40</td>
<td>70.5</td>
</tr>
<tr>
<td>NCY3B50</td>
<td>88.2</td>
</tr>
<tr>
<td>NCY3B63</td>
<td>105.8</td>
</tr>
</tbody>
</table>

Please consult with SMC in case a bracket with weight exceeding the above value is to be mounted.

Note 1) According to the dead weight deflection in the figure on the right, provide clearance so that the cylinder does not touch the mounting surface or the load, etc., and is able to operate smoothly within the minimum operating pressure range for a full stroke. For more information, refer to instruction manual.

Note 2) Adjust the clearance value by referring to the dead weight deflection as shown in the table on the right.

Vertical Operation

The load should be guided by a ball type bearing (linear guide, etc.). If a slide bearing is used, sliding resistance increases due to the load weight and load moment, which can cause malfunction.

<table>
<thead>
<tr>
<th>Model</th>
<th>Allowable load weight Wv (lb)</th>
<th>Max. operating pressure Pv (PSI)</th>
</tr>
</thead>
<tbody>
<tr>
<td>NCY3B6</td>
<td>2.2</td>
<td>79.8</td>
</tr>
<tr>
<td>NCY3B10</td>
<td>6.0</td>
<td>79.8</td>
</tr>
<tr>
<td>NCY3B15</td>
<td>15.4</td>
<td>94.3</td>
</tr>
<tr>
<td>NCY3B20</td>
<td>24.3</td>
<td>94.3</td>
</tr>
<tr>
<td>NCY3B25</td>
<td>40.8</td>
<td>94.3</td>
</tr>
<tr>
<td>NCY3B32</td>
<td>66.1</td>
<td>94.3</td>
</tr>
<tr>
<td>NCY3B40</td>
<td>103.6</td>
<td>94.3</td>
</tr>
<tr>
<td>NCY3B50</td>
<td>165.3</td>
<td>94.3</td>
</tr>
<tr>
<td>NCY3B63</td>
<td>253.5</td>
<td>94.3</td>
</tr>
</tbody>
</table>

* Use caution, as there is a danger of decoupling the piston if operated above the maximum operating pressure.
**Intermediate Stop**

1. **Intermediate stopping of a load with an external stopper, etc.**
   
   When stopping a load in mid-stroke using an external stopper, etc., operate within the operating pressure limits shown in the table below. Use caution, as operation at a pressure exceeding these limits can result in decoupling the piston.

<table>
<thead>
<tr>
<th>Model</th>
<th>Operating pressure limit for intermediate stop ( P_s ) (PSI)</th>
</tr>
</thead>
<tbody>
<tr>
<td>NCY3B6</td>
<td>79.8</td>
</tr>
<tr>
<td>NCY3B10</td>
<td>79.8</td>
</tr>
<tr>
<td>NCY3B15</td>
<td>94.3</td>
</tr>
<tr>
<td>NCY3B20</td>
<td>94.3</td>
</tr>
<tr>
<td>NCY3B25</td>
<td>94.3</td>
</tr>
<tr>
<td>NCY3B32</td>
<td>94.3</td>
</tr>
<tr>
<td>NCY3B40</td>
<td>94.3</td>
</tr>
<tr>
<td>NCY3B50</td>
<td>94.3</td>
</tr>
<tr>
<td>NCY3B63</td>
<td>94.3</td>
</tr>
</tbody>
</table>

2. **Intermediate stopping of a load with an air pressure circuit**

When performing an intermediate stop of a load using an air pressure circuit, operate at or below the kinetic energy shown in the table below. Use caution, as operation when exceeding the allowable value can result in decoupling the piston.

<table>
<thead>
<tr>
<th>Model</th>
<th>Allowable kinetic energy for intermediate stop ( E_s ) (J)</th>
</tr>
</thead>
<tbody>
<tr>
<td>NCY3B6</td>
<td>0.007</td>
</tr>
<tr>
<td>NCY3B10</td>
<td>0.03</td>
</tr>
<tr>
<td>NCY3B15</td>
<td>0.13</td>
</tr>
<tr>
<td>NCY3B20</td>
<td>0.24</td>
</tr>
<tr>
<td>NCY3B25</td>
<td>0.45</td>
</tr>
<tr>
<td>NCY3B32</td>
<td>0.88</td>
</tr>
<tr>
<td>NCY3B40</td>
<td>1.53</td>
</tr>
<tr>
<td>NCY3B50</td>
<td>3.12</td>
</tr>
<tr>
<td>NCY3B63</td>
<td>5.07</td>
</tr>
</tbody>
</table>

**Stroke End Stopping Method**

When stopping a load having a large inertial force at the stroke end, tilting of the body and damage to the bearings and cylinder tube may occur. (Refer to the left hand drawing below.) As shown in the right hand drawing below, a shock absorber should be used together with the stopper, and thrust should also be transmitted from the center of the body so that tilting will not occur.
Magnetically Coupled Rodless Cylinder Basic Type

**Series NCY3B**

ø6(1/4"), ø10(3/8"), ø15(5/8"), ø20(3/4"), ø25(1"), ø32(1-1/4"), ø40(1-1/2"), ø50(2"), ø63(2-1/2")

### How to Order

<table>
<thead>
<tr>
<th>Basic type</th>
<th>NCY3B</th>
<th>25</th>
<th>05</th>
<th>25</th>
<th>X116</th>
</tr>
</thead>
<tbody>
<tr>
<td>North American type</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Bore size (inch-Nominal)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>6</td>
<td>1/4&quot;</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>10</td>
<td>3/8&quot;</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>15</td>
<td>5/8&quot;</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>20</td>
<td>3/4&quot;</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>25</td>
<td>1&quot;</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>32</td>
<td>1-1/4&quot;</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>40</td>
<td>1-1/2&quot;</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>50</td>
<td>2&quot;</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>63</td>
<td>2-1/2&quot;</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

### Standard Stroke

<table>
<thead>
<tr>
<th>Bore size (mm)</th>
<th>Standard stroke (inch)</th>
<th>Max. stroke (inch)</th>
</tr>
</thead>
<tbody>
<tr>
<td>6</td>
<td>1/4&quot;</td>
<td>2, 3, 4, 5, 6, 8, 10</td>
</tr>
<tr>
<td>10</td>
<td>3/8&quot;</td>
<td>2, 3, 4, 5, 6, 8, 10</td>
</tr>
<tr>
<td>15</td>
<td>5/8&quot;</td>
<td>5, 10, 15, 20, 25, 30</td>
</tr>
<tr>
<td>20</td>
<td>3/4&quot;</td>
<td>5, 10, 15, 20, 25, 30, 40</td>
</tr>
<tr>
<td>25</td>
<td>1&quot;</td>
<td>5, 10, 15, 20, 25, 30, 40</td>
</tr>
<tr>
<td>32</td>
<td>1-1/4&quot;</td>
<td>5, 10, 15, 20, 25, 30, 40</td>
</tr>
<tr>
<td>40</td>
<td>1-1/2&quot;</td>
<td>5, 10, 15, 20, 25, 30, 40</td>
</tr>
<tr>
<td>50</td>
<td>2&quot;</td>
<td>5, 10, 15, 20, 25, 30, 40</td>
</tr>
<tr>
<td>63</td>
<td>2-1/2&quot;</td>
<td>5, 10, 15, 20, 25, 30, 40</td>
</tr>
</tbody>
</table>

Note) The longer the stroke, the larger the amount of deflection in a cylinder tube. Pay attention to the mounting bracket and clearance value.

### Magnetic Holding Force (lbf)

<table>
<thead>
<tr>
<th>Bore size (mm)</th>
<th>6</th>
<th>10</th>
<th>15</th>
<th>20</th>
<th>25</th>
<th>32</th>
<th>40</th>
<th>50</th>
<th>63</th>
</tr>
</thead>
<tbody>
<tr>
<td>(inch-Nominal)</td>
<td>1/4&quot;</td>
<td>3/8&quot;</td>
<td>5/8&quot;</td>
<td>3/4&quot;</td>
<td>1&quot;</td>
<td>1-1/4&quot;</td>
<td>1-1/2&quot;</td>
<td>2&quot;</td>
<td>2-1/2&quot;</td>
</tr>
<tr>
<td>Magnetic holding force</td>
<td>4.41</td>
<td>12.12</td>
<td>30.80</td>
<td>51.93</td>
<td>81.60</td>
<td>132.18</td>
<td>207.27</td>
<td>330.68</td>
<td>507.15</td>
</tr>
</tbody>
</table>
Specifications

<table>
<thead>
<tr>
<th>Fluid</th>
<th>Air</th>
</tr>
</thead>
<tbody>
<tr>
<td>Proof pressure</td>
<td>152 PSI (1.05 MPa)</td>
</tr>
<tr>
<td>Max. operating pressure</td>
<td>101 PSI (0.7MPa)</td>
</tr>
<tr>
<td>Min. operating pressure</td>
<td>Refer to the minimum operating pressure table.</td>
</tr>
<tr>
<td>Ambient and fluid temperature</td>
<td>14 to 140°F (~10 to 60°C) (No freezing)</td>
</tr>
<tr>
<td>Piston speed</td>
<td>2 to 20 inch/s (50 to 500 mm/s)</td>
</tr>
<tr>
<td>Cushion</td>
<td>Rubber bumper on both ends</td>
</tr>
<tr>
<td>Lubrication</td>
<td>Non-lube</td>
</tr>
<tr>
<td>Stroke length tolerance</td>
<td>0 to 10 st (inch): 0 to 0.04 inch (1.0 mm)</td>
</tr>
<tr>
<td></td>
<td>10.01 to 40 st (inch): 0 to 0.06 inch (1.4 mm)</td>
</tr>
<tr>
<td></td>
<td>40.01 st (inch): 0 to 0.07 inch (1.8 mm)</td>
</tr>
<tr>
<td>Mounting orientation</td>
<td>Horizontal, Inclined, Vertical Note</td>
</tr>
<tr>
<td>Mounting nut (2 pcs.)</td>
<td>Standard equipment (accessory)</td>
</tr>
</tbody>
</table>

Note) When vertically mounting, it is impossible to perform an intermediate stop by pneumatic circuit.

Theoretical Cylinder Thrust

Caution

When calculating the actual thrust, design should consider the minimum actuating pressure.

Minimum Operating Pressure

Note) Values show when the cylinder is driving without load.

Main Material

<table>
<thead>
<tr>
<th>Description</th>
<th>Material</th>
<th>Note</th>
</tr>
</thead>
<tbody>
<tr>
<td>Head cover</td>
<td>Aluminum alloy</td>
<td>Electroless nickel plated</td>
</tr>
<tr>
<td>Cylinder tube</td>
<td>Stainless steel</td>
<td></td>
</tr>
<tr>
<td>Body</td>
<td>Aluminum alloy</td>
<td>Hard anodized</td>
</tr>
<tr>
<td>Magnet</td>
<td>Rare earth magnet</td>
<td></td>
</tr>
</tbody>
</table>

Note) For details, refer to the construction drawings on page 7.
**Construction**

**Basic type**

**NCY3B6**

**NCY3B10, 15**

**NCY3B20 to 40**

**NCY3B50, 63**

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### Component Parts

<table>
<thead>
<tr>
<th>No.</th>
<th>Description</th>
<th>Material</th>
<th>Note</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Body</td>
<td>Aluminum alloy</td>
<td>Hard anodized</td>
</tr>
<tr>
<td>2</td>
<td>Head cover</td>
<td>ø6, ø10 Brass</td>
<td>Electroless Ni plated</td>
</tr>
<tr>
<td></td>
<td></td>
<td>ø15 to ø63 Aluminum alloy</td>
<td></td>
</tr>
<tr>
<td>3</td>
<td>End collar</td>
<td>Aluminum alloy</td>
<td>ø20 to ø40 only</td>
</tr>
<tr>
<td>4</td>
<td>Cylinder tube</td>
<td>Stainless steel</td>
<td></td>
</tr>
<tr>
<td>5</td>
<td>Piston</td>
<td>ø6 to ø15 Brass</td>
<td>Electroless Ni plated</td>
</tr>
<tr>
<td></td>
<td></td>
<td>ø20 to ø63 Aluminum alloy</td>
<td>Chromated</td>
</tr>
<tr>
<td>6</td>
<td>Shaft</td>
<td>Stainless steel</td>
<td></td>
</tr>
<tr>
<td>7</td>
<td>Piston side yoke</td>
<td>Rolled steel</td>
<td>Zinc chromated</td>
</tr>
<tr>
<td>8</td>
<td>External slider side yoke</td>
<td>Rolled steel</td>
<td>Zinc chromated</td>
</tr>
<tr>
<td>9</td>
<td>Magnet A</td>
<td>Rare earth magnet</td>
<td></td>
</tr>
<tr>
<td>10</td>
<td>Magnet B</td>
<td>Rare earth magnet</td>
<td></td>
</tr>
<tr>
<td>11</td>
<td>Spacer</td>
<td>Aluminum alloy</td>
<td>ø6: not available</td>
</tr>
<tr>
<td>12</td>
<td>Damper</td>
<td>Urethane rubber</td>
<td></td>
</tr>
<tr>
<td>13</td>
<td>Piston nut</td>
<td>Carbon steel</td>
<td>ø6 to ø15: not available</td>
</tr>
<tr>
<td>14</td>
<td>C type snap ring for hole</td>
<td>Carbon tool steel</td>
<td>Nickel plated</td>
</tr>
<tr>
<td>15</td>
<td>Wear ring A</td>
<td>Special resin</td>
<td></td>
</tr>
<tr>
<td>16</td>
<td>Wear ring B</td>
<td>Special resin</td>
<td></td>
</tr>
<tr>
<td>17</td>
<td>Piston seal</td>
<td>NBR</td>
<td></td>
</tr>
<tr>
<td>18</td>
<td>Lubretainer</td>
<td>Special resin</td>
<td>ø6: not available</td>
</tr>
<tr>
<td>19</td>
<td>Cylinder tube gasket</td>
<td>NBR</td>
<td>ø6, ø10 only</td>
</tr>
</tbody>
</table>

### Replacement Parts: Seal Kit

<table>
<thead>
<tr>
<th>Bore size (mm)</th>
<th>Kit no.</th>
<th>Contents</th>
</tr>
</thead>
<tbody>
<tr>
<td>6</td>
<td>CY3B6-PS</td>
<td>Numbers 16, 17, 18 above</td>
</tr>
<tr>
<td>10</td>
<td>CY3B10-PS</td>
<td>Numbers 15, 16, 17, 18, 19 above</td>
</tr>
<tr>
<td>15</td>
<td>CY3B15-PS</td>
<td></td>
</tr>
<tr>
<td>20</td>
<td>CY3B20-PS</td>
<td></td>
</tr>
<tr>
<td>25</td>
<td>CY3B25-PS</td>
<td></td>
</tr>
<tr>
<td>32</td>
<td>CY3B32-PS</td>
<td></td>
</tr>
<tr>
<td>40</td>
<td>CY3B40-PS</td>
<td></td>
</tr>
<tr>
<td>50</td>
<td>CY3B50-PS</td>
<td></td>
</tr>
<tr>
<td>63</td>
<td>CY3B63-PS</td>
<td></td>
</tr>
</tbody>
</table>

**Note 1)** Seal kits are sets consisting of numbers 15 through 19. Order using the kit number corresponding to each bore size.

**Note 2)** Adhesives are applied to the secured portion of the head cover and the cylinder tube. For bore sizes of more than ø32(1-1/4”) of the cylinder removing the head cover can be difficult.
## Magnetically Coupled Rodless Cylinder
### Basic Type

#### Dimensions

##### Basic Type

<table>
<thead>
<tr>
<th>Model</th>
<th>Symbol</th>
<th>A</th>
<th>B</th>
<th>C</th>
<th>CC</th>
<th>D</th>
<th>F</th>
<th>G</th>
<th>H</th>
<th>I</th>
<th>J</th>
<th>K</th>
<th>L</th>
<th>MM</th>
<th>N</th>
<th>NA</th>
<th>NN</th>
<th>P</th>
</tr>
</thead>
<tbody>
<tr>
<td>NCY3B6</td>
<td>—</td>
<td>0.16</td>
<td>0.67</td>
<td>0.44</td>
<td>—</td>
<td>0.30</td>
<td>0.31</td>
<td>0.20</td>
<td>0.53</td>
<td>—</td>
<td>0.16</td>
<td>0.19</td>
<td>1.38</td>
<td>5-40UNC</td>
<td>0.37</td>
<td>0.39</td>
<td>1/4-28UNF</td>
<td>M3 x 0.5</td>
</tr>
<tr>
<td>NCY3B10</td>
<td>—</td>
<td>0.12</td>
<td>0.98</td>
<td>0.55</td>
<td>—</td>
<td>0.47</td>
<td>0.37</td>
<td>0.20</td>
<td>0.50</td>
<td>—</td>
<td>0.18</td>
<td>0.19</td>
<td>1.50</td>
<td>5-40UNC</td>
<td>0.44</td>
<td>0.55</td>
<td>3/8-24UNF</td>
<td>10-32UNF</td>
</tr>
<tr>
<td>NCY3B15</td>
<td>—</td>
<td>0.12</td>
<td>1.38</td>
<td>0.55</td>
<td>—</td>
<td>0.65</td>
<td>0.37</td>
<td>0.21</td>
<td>0.50</td>
<td>—</td>
<td>0.24</td>
<td>0.37</td>
<td>2.24</td>
<td>8-32UNC</td>
<td>0.43</td>
<td>0.67</td>
<td>3/8-24UNF</td>
<td>10-32UNF</td>
</tr>
<tr>
<td>NCY3B20</td>
<td>—</td>
<td>0.38</td>
<td>1.42</td>
<td>0.94</td>
<td>—</td>
<td>0.85</td>
<td>0.51</td>
<td>0.30</td>
<td>0.79</td>
<td>1.10</td>
<td>0.24</td>
<td>0.31</td>
<td>2.60</td>
<td>8-32UNC</td>
<td>0.71</td>
<td>0.94</td>
<td>5/8-18UNF</td>
<td>NPT1/8</td>
</tr>
<tr>
<td>NCY3B25</td>
<td>—</td>
<td>0.31</td>
<td>1.81</td>
<td>1.22</td>
<td>—</td>
<td>1.04</td>
<td>0.50</td>
<td>0.30</td>
<td>0.81</td>
<td>1.34</td>
<td>0.31</td>
<td>0.38</td>
<td>2.76</td>
<td>10-32UNC</td>
<td>0.73</td>
<td>1.18</td>
<td>1-12UNC</td>
<td>NPT1/8</td>
</tr>
<tr>
<td>NCY3B32</td>
<td>—</td>
<td>0.31</td>
<td>2.36</td>
<td>1.22</td>
<td>—</td>
<td>1.32</td>
<td>0.63</td>
<td>0.31</td>
<td>0.87</td>
<td>1.58</td>
<td>0.31</td>
<td>0.51</td>
<td>3.15</td>
<td>1/4-28UNF</td>
<td>0.79</td>
<td>1.42</td>
<td>1-12UNC</td>
<td>NPT1/8</td>
</tr>
<tr>
<td>NCY3B40</td>
<td>—</td>
<td>0.43</td>
<td>2.76</td>
<td>1.61</td>
<td>—</td>
<td>1.64</td>
<td>0.63</td>
<td>0.41</td>
<td>1.13</td>
<td>1.97</td>
<td>0.39</td>
<td>0.56</td>
<td>3.62</td>
<td>1/4-28UNF</td>
<td>1.00</td>
<td>1.81</td>
<td>1-1/4-12UNC</td>
<td>NPT1/4</td>
</tr>
<tr>
<td>NCY3B50</td>
<td>—</td>
<td>3.39</td>
<td>—</td>
<td>1.26</td>
<td>2.06</td>
<td>0.08</td>
<td>0.55</td>
<td>1.25</td>
<td>2.26</td>
<td>0.47</td>
<td>1.00</td>
<td>4.50</td>
<td>5/16-24UNF</td>
<td>1.02</td>
<td>2.17</td>
<td>—</td>
<td>NPT1/4</td>
<td></td>
</tr>
<tr>
<td>NCY3B63</td>
<td>—</td>
<td>3.94</td>
<td>—</td>
<td>1.50</td>
<td>2.57</td>
<td>0.08</td>
<td>0.55</td>
<td>1.25</td>
<td>2.83</td>
<td>0.47</td>
<td>1.00</td>
<td>5.00</td>
<td>5/16-24UNF</td>
<td>1.02</td>
<td>2.72</td>
<td>—</td>
<td>NPT1/4</td>
<td></td>
</tr>
</tbody>
</table>

Note 1) ø50, ø63: L < sub > 1 </ sub >

---

### Mounting Nut

Included in the package (2 pcs).

---

**Note**

1. The asterisk denotes the dimensions which are different from the NCY2B series.
2. When installing cylinder, a mounting bracket may be used.

---

**Note**

Not available for ø50 and ø63.
## Series NCY3B

**Made to Order**

Please contact SMC for detailed specifications, lead times and prices.

<table>
<thead>
<tr>
<th>Symbol</th>
<th>Contents</th>
<th>Model</th>
<th>Bore size (mm/inch-nominal)</th>
</tr>
</thead>
<tbody>
<tr>
<td>XB6</td>
<td>Heat resistant cylinder (150°C (302°F) specification)</td>
<td>NCY3B</td>
<td>6 10 15 20 25 32 40 50 63</td>
</tr>
<tr>
<td>XB13</td>
<td>Low speed cylinder (0.3 to 2.0 inch/s)</td>
<td>NCY3B</td>
<td></td>
</tr>
<tr>
<td>X116</td>
<td>Hydro specification</td>
<td>NCY3B</td>
<td></td>
</tr>
<tr>
<td>X132</td>
<td>Axial ports</td>
<td>NCY3B</td>
<td></td>
</tr>
<tr>
<td>X160</td>
<td>High speed specification</td>
<td>NCY3B</td>
<td></td>
</tr>
<tr>
<td>X168</td>
<td>Helical insert thread specification</td>
<td>NCY3B</td>
<td></td>
</tr>
<tr>
<td>X206</td>
<td>Added mounting tap positions for slider</td>
<td>NCY3B</td>
<td></td>
</tr>
<tr>
<td>X210</td>
<td>Oil-free exterior specification</td>
<td>NCY3B</td>
<td></td>
</tr>
<tr>
<td>X322</td>
<td>Outside of cylinder tube with hard chrome plating</td>
<td>NCY3B</td>
<td></td>
</tr>
<tr>
<td>X324</td>
<td>Oil-free exterior specification (with dust seal)</td>
<td>NCY3B</td>
<td></td>
</tr>
<tr>
<td>X1468</td>
<td>Interchangeable specification with NCY2B6</td>
<td>NCY3B</td>
<td></td>
</tr>
<tr>
<td>XC24</td>
<td>With magnetic shielding plate</td>
<td>NCY3B</td>
<td></td>
</tr>
<tr>
<td>XC57</td>
<td>With floating joint</td>
<td>NCY3B</td>
<td></td>
</tr>
</tbody>
</table>

Note 1) XB9, Low speed cylinder (0.6 to 2.0 inch/s) can also be produced (NCY3B6 to 63).
**Series NCY3B**

Made to Order 1

Please contact SMC for detailed specifications, lead times and prices.

---

### 1 Heat resistant cylinder [150°C (302°F) specification]

**Symbol** XB6

**NCY3B [Bore size – Stroke – XB6**

#### Heat resistant cylinder

**Specifications**

- **Bore size**: ø6 to ø63 (1/4” to 2-1/2”)
- **Ambient and fluid temperature**: 50 to 150°C (122 to 302°F)
- **Max. operating pressure**: 72.5 PSI
- **Piston speed**: 2.0 to 16 inch/s (50 to 400 mm/s)

*When using in less than 100°C (212°F) range, since it could make a difference in the maintenance cycle, depending on the operating speed, use it at 200 mm/s (7.9 inch/s) or less.*

**Operating Pressure Limit for Intermediate Stop and Vertical Operation**

| Max. operating pressure for intermediate stop | 58.0 PSI |

*Decoupling of the piston can occur if the cylinder is used to stop in an intermediate stroke by an external stopper with the operating pressure over 58.0 PSI.*

**Magnetic Holding Force**

<table>
<thead>
<tr>
<th>Bore size (mm)</th>
<th>6</th>
<th>10</th>
<th>15</th>
<th>20</th>
<th>25</th>
<th>32</th>
<th>40</th>
<th>50</th>
<th>63</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>1/4”</td>
<td>3/8”</td>
<td>5/8”</td>
<td>3/4”</td>
<td>1”</td>
<td>1-1/4”</td>
<td>1-1/2”</td>
<td>2”</td>
<td>2-1/2”</td>
</tr>
<tr>
<td>Holding force (at 302°F)</td>
<td>3.2</td>
<td>9.0</td>
<td>20.3</td>
<td>36.0</td>
<td>56.2</td>
<td>92.2</td>
<td>144.1</td>
<td>224.8</td>
<td>357.4</td>
</tr>
<tr>
<td>Holding force (at 212°F)</td>
<td>3.9</td>
<td>10.8</td>
<td>24.1</td>
<td>43.2</td>
<td>67.2</td>
<td>110.2</td>
<td>172.2</td>
<td>267.5</td>
<td>427.1</td>
</tr>
</tbody>
</table>

When using with the operating temperature fluctuated between 50°C (122°F) or less and 100°C (212°F) or more, the operating speed, etc. will be largely restricted by the durability. Prior to use, please contact SMC.

**<Reference>**

Maintenance cycle for XB6 could vary substantially, depending on the operating condition and the ambient temperature. Even if using in our recommended range, as a guide, conduct it in around 1/2 intervals, compared to the standard products.

---

### 2 Low speed [0.3 to 2.0 inch/s (7 to 50 mm/s)] specification

**Symbol** XB13

**NCY3B [Bore size – Stroke – XB13**

#### Low speed

There is no sticking and slipping even at very low drive speeds of 0.3 to 2.0 inch/s (7 to 50 mm/s). Furthermore, there is no lurching at start-up, allowing smooth drive through the entire stroke.

**Specifications**

<table>
<thead>
<tr>
<th>Applicable series</th>
<th>NCY3B</th>
</tr>
</thead>
<tbody>
<tr>
<td>Bore size</td>
<td>ø6 to ø63 (1/4” to 2-1/2”)</td>
</tr>
<tr>
<td>Piston speed</td>
<td>0.3 to 2.0 inch/s (7 to 50 mm/s)</td>
</tr>
</tbody>
</table>
Series NCY3B
Made to Order 2
Please contact SMC for detailed specifications, lead times and prices.

3 Air Hydro specification X116
NCY3B Bore size Stroke X116

Suitable for precision low speed feeding, intermediate stopping and skip feeding of the cylinder.

Specifications

<table>
<thead>
<tr>
<th>Bore size</th>
<th>ø25 to ø63 (1” to 2-1/2”)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Fluid</td>
<td>Turbine oil</td>
</tr>
<tr>
<td>Piston speed</td>
<td>0.6 to 12 inch/s (15 to 300 mm/s)</td>
</tr>
</tbody>
</table>

Note 1) When performing intermediate stops with an air-hydro circuit, set the kinetic energy of the load so that it does not exceed the allowable value. (Regarding the allowable value, refer to the section “Intermediate stops” for each series.)

4 Axial ports X132
NCY3B Bore size Stroke X132

The air supply port has been changed to an axial position on the head cover.

Specifications

| Bore size | ø6 to ø63 (1/4” to 2-1/2”) |

5 High speed specification X160
NCY3B Bore size Stroke X160

Makes possible high speed piston drive of 1500mm/s (59.1 inch/s) (without load).

Specifications

| Bore size | ø20 to ø63 (3/4” to 2-1/2”) |
| Piston speed (no load) | 59.1 inch/s (1500 mm/s) |

Note 1) When operating this cylinder at high speed, a shock absorber must be provided.

6 Helical insert thread specification X168
NCY3B Bore size Stroke X168

The standard mounting threads have been changed to the helical insert thread specifications.

Specifications

| Bore size | ø20 to ø63 (3/4” to 2-1/2”) |

7 Added mounting tap positions for slider X206
NCY3B Bore size Stroke X206

Mounting taps have been added on the surface opposite the standard positions.

Specifications

| Bore size | ø6 to ø63 (1/4” to 2-1/2”) |

* Dimensions are the same as the standard product.
Series N CY3B
Made to Order 3
Please contact SMC for detailed specifications, lead times and prices.

8 Oil-free exterior specification

NCY3B Bore size Stroke X210

Oil-free exterior specification

Suitable for environments where oil is not tolerated. A lubretainer is not installed. A separate version X324 (with dust seal) is available in cases in which dust, etc. is dispersed throughout the environment.

Specifications

| Bore size | ø6 to ø63 (1/4" to 2-1/2") |

Construction

NCY3B

9 Outside of cylinder tube with hard chrome plating

NCY3B Bore size Stroke X322

Outside of cylinder tube with hard chrome plating

The outside of the cylinder tube has been plated with hard chromium for reducing wear on the bearings.

Specifications

| Bore size | ø15 to ø63 (5/8" to 2-1/2") |

Construction

NCY3B

10 Oil-free exterior specification (with dust seal)

NCY3B Bore size Stroke X324

Oil-free exterior specification (with dust seal)

This unit has oil-free exterior specifications, with a dust seal provided on the cylinder body.

Specifications

| Bore size | ø10 to ø63 (3/8" to 2-1/2") |

Construction

NCY3B

Dust seal (felt)

Special bearing

11 Interchangeable specification with NCY2B6

NCY3B 6 Stroke X1468

Interchangeable specification with the NCY2B6

Mounting dimensions are interchangeable with the NCY2B6.

12 With magnetic shielding plate

NCY3B Bore size Stroke XC24

With magnetic shielding plate

Protective shields to minimize external influence of carriage magnet assembly.

Specifications

| Bore size | ø6 to ø63 (1/4" to 2-1/2") |

Dimensions

<table>
<thead>
<tr>
<th>Bore size (mm)</th>
<th>ø6</th>
<th>ø10</th>
<th>ø15</th>
<th>ø20</th>
<th>ø25</th>
<th>ø32</th>
<th>ø40</th>
<th>ø50</th>
<th>ø63</th>
</tr>
</thead>
<tbody>
<tr>
<td>1/4&quot;</td>
<td>0.75</td>
<td>1.06</td>
<td>1.46</td>
<td>1.50</td>
<td>1.89</td>
<td>2.44</td>
<td>2.83</td>
<td>3.46</td>
<td>4.02</td>
</tr>
<tr>
<td>3/8&quot;</td>
<td>0.67</td>
<td>0.98</td>
<td>1.38</td>
<td>1.42</td>
<td>1.81</td>
<td>2.36</td>
<td>2.76</td>
<td>3.39</td>
<td>3.94</td>
</tr>
</tbody>
</table>

* Dimensions other than above are the same as the standard type.
Series NCY3B
Made to Order 4
Please contact SMC for detailed specifications, lead times and prices.

With floating joint

NCY3B Bore size Stroke XC57

A special floating joint is added to the NCY3B series, and the number of connections to the guide on the other axis (the load side) is reduced. The attachment of the bolt to the floating joint and the load is not limited to the top or bottom.

Specifications

<table>
<thead>
<tr>
<th>Bore size</th>
<th>ø6 to ø63 (1/4&quot; to 2-1/2&quot;)</th>
</tr>
</thead>
</table>

Note) Since the body of this cylinder is designed for connection with a floating joint, and cannot be connected to the bodies of standard products, please contact SMC if necessary.

Dimensions

Note 1) Dimension F provides a clearance of 0.04 inch between the body and the floating joint, but does not consider dead weight deflection of the cylinder tube, etc. When put into operation, an appropriate value should be set which considers dead weight deflection and alignment variations with respect to the other axis. (Refer to the dead weight deflection table on page 5.)

Note 2) Use caution when attached from the top and operated at or above dimension R (0.12 inch or more for ø6 (1/4") and ø10 (3/8")), because the end of the screw will contact the body, and floating cannot be maintained in some cases.
**Series NCY3B**

**Safety Instructions**

These safety instructions are intended to prevent a hazardous situation and/or equipment damage. These instructions indicate the level of potential hazard by labels of "Caution", "Warning" or "Danger". To ensure safety, be sure to observe ISO 4414 Note 1), JIS B 8370 Note 2) and other safety practices.

### Explanation of the Labels

<table>
<thead>
<tr>
<th>Labels</th>
<th>Explanation of the labels</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Danger</strong></td>
<td>In extreme conditions, there is a possible result of serious injury or loss of life.</td>
</tr>
<tr>
<td><strong>Warning</strong></td>
<td>Operator error could result in serious injury or loss of life.</td>
</tr>
<tr>
<td><strong>Caution</strong></td>
<td>Operator error could result in injury or equipment damage.</td>
</tr>
</tbody>
</table>

**Note 1)** ISO 4414: Pneumatic fluid power – General rules relating to systems  
**Note 2)** JIS B 8370: General Rules for Pneumatic Equipment  
**Note 3)** Injury indicates light wounds, burns and electrical shocks that do not require hospitalization or hospital visits for long-term medical treatment.  
**Note 4)** Equipment damage refers to extensive damage to the equipment and surrounding devices.

### Selection/Handling/Applications

1. **The compatibility of the pneumatic equipment is the responsibility of the person who designs the pneumatic system or decides its specifications.**  
Since the products specified here are used in various operating conditions, their compatibility for the specific pneumatic system must be based on specifications or post analysis and/or tests to meet the specific requirements. The expected performance and safety assurance are the responsibility of the person who has determined the compatibility of the system. This person should continuously review the suitability of all items specified, referring to the latest catalog information with a view to giving due consideration to any possibility of equipment failure when configuring a system.

2. **Only trained personnel should operate pneumatically operated machinery and equipment.**  
Compressed air can be dangerous if handled incorrectly. Assembly, handling or repair of pneumatic systems should be performed by trained and experienced operators.

3. **Do not service machinery/equipment or attempt to remove components until safety is confirmed.**  
1. Inspection and maintenance of machinery/equipment should only be performed once measures to prevent falling or runaway of the driver objects have been confirmed.  
2. When equipment is removed, confirm that safety process as mentioned above. Turn off the supply pressure for this equipment and exhaust all residual compressed air in the system.  
3. Before machinery/equipment is restarted, take measures to prevent quick extension of a cylinder piston rod, etc.

4. **Contact SMC if the product will be used in any of the following conditions:**  
1. Conditions and environments beyond the given specifications, or if product is used outdoors.  
2. Installation on equipment in conjunction with atomic energy, railway, air navigation, vehicles, medical equipment, food and beverages, recreation equipment, emergency stop circuits, clutch and brake circuits in press applications, or safety equipment.  
3. An application which has the possibility of having negative effects on people, property, or animals, requiring special safety analysis.  
4. If the products are used in an interlock circuit, prepare a double interlock style circuit with a mechanical protection function for the prevention of a breakdown. And, examine the devices periodically if they function normally or not.

### Exemption from Liability

1. **SMC, its officers and employees shall be exempted from liability for any loss or damage arising out of earthquakes or fire, action by a third person, accidents, customer error with or without intention, product misuse, and any other damages caused by abnormal operating conditions.**

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3. **SMC is exempted from liability for any damages caused by operations not contained in the catalogs and/or instruction manuals, and operations outside of the specification range.**

4. **SMC is exempted from liability for any loss or damage whatsoever caused by malfunctions of its products when combined with other devices or software.**
**Series NCY3B**

**Specific Product Precautions**

Be sure to read this before handling. For Safety Instructions, Actuators Precautions, refer to “Precautions for Handling Pneumatic Devices” (M-03-E3A).

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**Mounting**

**Caution**

1. **Take care to avoid nicks or other damage on the outside surface of the cylinder tube.**
   
   This can lead to damage of the scraper and wear ring, which in turn can cause malfunction.

2. **Take care regarding rotation of the external slider.**
   
   Rotation should be controlled by connecting it to another shaft (linear guide, etc.).

3. **Do not operate with the magnetic coupling out of position.**
   
   In case the magnetic coupling is out of position, push the external slider back into the correct position by hand at the end of the stroke (or correct the piston slider with air pressure).

4. **Be sure that both end covers are secured to the mounting surface before operating the cylinder.**
   
   Avoid operation with the external slider secured to the surface.

5. **Do not apply a lateral load to the external slider.**
   
   When a load is mounted directly to the cylinder, variations in the alignment of each shaft center cannot be assimilated, which results in the generation of a lateral load that can cause malfunction. (Figure 1) The cylinder should be operated using a connection method which allows for assimilation of shaft alignment variations and deflection due to the cylinder’s own weight. A drawing of a recommended mounting is shown in Figure 2.

6. **Use caution regarding the allowable load weight when operating in a vertical direction.**
   
   The allowable load weight when operating in a vertical direction (reference values on page 3) is determined by the model selection method, however, if a load greater than the allowable value is applied, the magnetic coupling may break and there is a possibility of dropping the load. When using this type of application, please contact SMC regarding the operating conditions (pressure, load, speed, stroke, frequency, etc.).

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**Disassembly & Maintenance**

**Caution**

7. **Careful alignment is necessary when connecting to a load having an external guide mechanism.**
   
   As the stroke becomes longer, variations in the center axis become larger. Consider using a connection method (floating mechanism) that is able to absorb these variations. Furthermore, use the special floating brackets (XC57) which have been provided for the NCY3B series (page 13).

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**Warning**

1. **Use caution as the attractive power of the magnets is very strong.**
   
   When removing the external slider and piston slider from the cylinder tube for maintenance, etc., handle with caution, since the magnets installed in each slider have very strong attractive power.

2. **When reattaching the head covers after disassembly, confirm that they are tightened securely. (NCY3B)**
   
   When disassembling, hold the wrench flat section of one head cover with a vise, and remove the other cover using a spanner or adjustable angle wrench on its wrench flat section. When retightening, first coat with Loctite® (No. 542 red), and retighten 3 to 5° past the original position prior to removal.

3. **Use caution when taking off the external slider, as the piston slider will be directly attracted to it.**
   
   When removing the external slider or piston slider from the cylinder tube, first force the sliders out of their magnetically coupled positions and then remove them individually while there is no longer any holding force. If they are removed when still magnetically coupled, they will be directly attracted to one another and will not come apart.

4. **Do not disassemble the magnetic components (piston slider, external slider).**
   
   This can cause a loss of holding force and malfunction.

5. **When disassembling to replace the seals and wear ring, refer to the separate disassembly instructions.**
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SMC Corporation of America
3011 N. Franklin Road
Indianapolis, IN 46226
(800) 762-7621 (SMC.SMC1)
www.smcusa.com
For International Inquires: www.smcworld.com

SMC Pneumatics (Canada) Ltd.
6768 Financial Drive Mississauga
Ontario, L5N 7J6 Canada
(905) 812-0400
www.smpcneumatics.ca