NFPA Aluminum & Steel Cylinders

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NFPA - National Fluid Power Association
Series A Cylinders are constructed with the finest materials for each component!

1. **Piston Rod**: Hard chrome plated high-tensile steel, ground and polished.

2. **Rod Bearing**: External removable threaded steel bearing housing (black oxide finish), with an oil-impregnated sintered iron rod bearing.

3. **Rod Seal**: Nitrile lip-type seal is pressure energized and wear compensating for durability and long life.

4. **Head/Cap**: Precision machined from alloy aluminum, then anodized for corrosion resistance (black finish).

5. **Ultra Cushion® Seals**: Advanced design features a unique, one-piece, compound seal of nitrile* captured within a precision machined groove. Linear and radial “float” of the cushion seals eliminates misalignment. Ultra Cushions provide exceptionally fast “out of cushion” stroke reversal. (Head and Cap Cushions are optional.)

6. **O-Ring Tube Seal**: Buna is standard. (Viton is optional.)

7. **Tie Rods**: High-strength steel maintains uniform compression on tube end seals.

8. **Piston**: Machined solid aluminum alloy, light-weight for low inertia, yet strong. Threaded piston is installed with high strength threadlocker adhesive then staked to the piston rod.

9. **Adjustable Captive Cushion Needle**: A one-piece, precision threaded brass cushion adjustment screw with a threaded steel capture ring. It provides safe and precise cushion adjustment.

10. **Wiper Seal**: Lip-type urethane wiper seal keeps contaminates from getting into cylinder by aggressively wiping foreign materials from the piston rod, enhancing the rod seal life.

11. **Cylinder Tube**: High-strength aluminum alloy ideally suited for air service. The tube is clear anodized on the O.D. and hard anodic coated on the I.D., resulting in a smooth, file hard (60RC), corrosion and score resistant surface finish.

12. **Piston Seals**: Long-wearing nitrile seals.

13. **Wear Ring**: Reinforced Teflon® compounded with polyphenylene sulfide provides supreme wear and excellent bearing support.

Application Information
Series A NFPA interchangeable aluminum air cylinders are offered with a variety of accessories, standard and optional equipment to meet your application needs.

The addition of a Teflon® wear ring to the outer perimeter of the piston permits us to guarantee its operation against failure due to lack of lubrication for ONE FULL YEAR, regardless of cycles! See page ACT-1-98 for complete warranty.

Standard non-cushioned Series A cylinders are recommended for applications that require full bottoming of the piston and where the noise emitted by the metal-to-metal impact between the piston and cylinder end caps is tolerable. We recommend that optional non-adjustable cushions be added for piston speeds (moving light tools) ranging from 15 to 30 in/sec. For speeds exceeding 30 in/sec, the cylinders should be equipped with adjustable air cushions.
Series EA Ecology Cylinders are constructed with the finest materials for each component!

1. **Ultra Cushion® Seals**: Advanced design features a unique, one-piece, compound seal of nitrile* captured within a precision machined groove. Linear and radial “float” of the cushion seals eliminates misalignment. Ultra Cushions provide exceptionally fast “out of cushion” stroke reversal. (Head and Cap Cushions are optional.)

* Nitrile seals on the 5/8” & 1” rod diameter. For rod sizes 1-3/8” and larger, urethane seals are standard.

2. **Impact Dampening Piston Seals**: Our impact dampening piston seals, in conjunction with our advanced cushion design, decelerate and reduce end-of-stroke noise.

3. **Piston**: Machined solid aluminum alloy, light-weight for low inertia, yet strong. Threaded piston is installed with high strength threadlocker adhesive then staked to the piston rod.

4. **O-Ring Tube Seal**: Buna is standard. (Viton is optional.)

5. **Adjustable Captive Cushion Needle (not shown)**: Fine thread allows for safe and precision adjustment of cushion. (See page 2.)

6. **Wiper Seal**: Lip-type urethane wiper seal keeps contaminants from getting into cylinder by aggressively wiping foreign materials from the piston rod, enhancing the rod seal life.

7. **Piston Rod**: Hard chrome plated high-tensile steel, ground and polished.

8. **Head/Cap**: Precision machined from alloy aluminum, then anodized for corrosion resistance (black finish).

9. **Wear Ring**: Reinforced Teflon® compounded with polyphenylene sulfide provides supreme wear and excellent bearing support.

10. **Tie Rods**: High-strength steel maintains uniform compression on tube end seals.

11. **Cylinder Tube**: High-strength aluminum alloy ideally suited for air service. The tube is clear anodized on the O.D. and hard anodic coated on the I.D., resulting in a smooth, file hard (60HRc), corrosion and score resistant surface finish.

12. **Rod Seal**: Nitrile lip-type seal is pressure energized and wear compensating for durability and long life.

13. **Rod Bearing**: External removable steel bearing housing (black oxide finish), with an oil-impregnated sintered iron rod bearing.
Norgren Ecology Cylinders offer these advantages:

1. **Norgren Guarantees Non-lubricated Operation for a Full Year!**
The piston rod is self-lubricated by the oil-impregnated rod bearing during operation. Lubrication between piston and cylinder barrel is derived from the polishing qualities of the reinforced Teflon® wear ring.

The low friction surfaces extend the life of the seals beyond normal expectations, permitting Norgren to unconditionally guarantee non-lubricated operation for one full year. See page ACT-1-98 for complete warranty.

Series EA cylinders are NFPA interchangeable and are available in many different mounting styles.

2. **Operates Quietly to Meet OSHA Specifications.**
Series EA cylinders provide substantial reductions in impact noise, which reduces overall machine noise and helps meet government regulations.

The summary of sound decibels chart illustrates the operating sound levels.

The impact dampening qualities of the Piston Seals are guaranteed for ONE FULL YEAR!

3. **Energy Absorption Capacity of the Impact Dampening Seals**
*Usable Pounds Stoppable at the Following Piston Speeds*

This chart features the energy absorption capacity of the impact dampening piston seals with Non-Adjustable cushions. For higher loads and velocities please refer to the Decel-Air™ Cushion Option on ACT-1-10.

### Energy Absorption Capacity of the Impact Dampening Piston Seals with an Adjustable Cushion.

### Effect of Impact Dampening Seals on Total Stroke of Cylinders

Note: These figures are for new cylinders. The impact dampening seals will take some compression set during operation. Also, the pressure at zero stroke loss will decrease to about 90 psi.

At pressures above those of zero stroke loss, a slight clicking sound may be produced during impact. To determine the stroke loss for either the head or cap end, divide the value shown by 2.
Series A & EA, NFPA Aluminum Air Cylinders (ø1-1/2” to 8”), Technical Features

Cushion Function

As the cushion spear enters the cushion cavity, the exhaust port becomes sealed off creating an air brake. This provides the initial deceleration in piston speed. The oversized air cushion bleed orifice permits the cushion pressure to exhaust with minimal restriction. This allows the piston to move quickly and smoothly through the cushion length.

As the piston continues its travel to the point of impact with the end caps, the compressive qualities of the EJ seal provide the final decelerating force. This action compresses the EJ seal and absorbs the remaining kinetic shock vibration and noise created by the impact.

On the reverse stroke the EJ seal releases its compressive energy to propel the piston away from the end caps, producing an immediate breakaway.

Operating Temperatures:
- Series EA: -20°F to 200°F (-29°C to 107°C)
- with Viton Seals: -20°F to 400°F (-29°C to 204°C)

Operating Pressure:
- 250 PSIG Air (17 Bar)
- EA Cylinders cannot be used in hydraulic applications.

Supply:
- Filtered compressed air to 250 PSI

Lubrication:
- None required
- Norgren Air Cylinders are rated for “no lube added” service. All internal components are lubricated at time of assembly with a Teflon® based grease.

Materials:
- Head and End Caps: black anodized 6061-T6 aluminum
- Tube: 6063-T832 aluminum, clear anodized O.D., hardcoat anodized I.D.
- Rod: hard chrome plated steel
- Piston: machined high-strength aluminum alloy
- Rod Bearing: oil impregnated sintered iron
- Seals: nitrile rod seal, urethane rod wiper, nitrile piston seals, nitrile tube end seals
- Tie Rods: high-tensile strength steel

Air Cylinder Selection:
The proper application and selection of an air cylinder requires full consideration of the following: the fluid medium, operating pressures, mounting style, length of stroke, type of rod connection to the load, thrust or mounting tension on the rod, mounting attitude, speed of the stroke and how the load motion will be stopped.

The data that follows provides the necessary information in the evaluation of an average application and will help you in selecting the proper cylinder model and size for your particular application.

Note: 1-1/2", 2", 2-1/2", 3-1/4", 4" and 5" bore cylinders with 1/2" to 2" strokes will be furnished with a short head cushion sleeve and short cap cushion spear. Only available on 5/8" and 1" rods.

The above specification applies to Series EA cylinders with standard non-adjustable or optional adjustable cushions.

Side Loading:
- Cylinders are specifically designed to push and pull. Side loading (misalignment) of the piston rod should be avoided to ensure maximum operating performance and life.
- Care should be taken during installation to properly align the load to be moved with the center line of the cylinder.
- The use of a rod alignment coupler (see page ACT-1-94) is strongly recommended whenever possible.

Series EA Fixed Cushions
- Piston and rod assembly for 1-1/2" thru 5" bore cylinders with less than 1/2" stroke.
- 6" thru 8" bore cylinders with less than 2" stroke.

Ultra Cushion®
A Major Design and Performance Breakthrough in Air Cylinder Cushioning Systems!

Norgren’s advanced cushion design features a unique, one-piece, nitrile compound seal that is captured within a precision machined groove. This allows both linear and radial “float” of the cushion seal which virtually eliminates problems associated with misalignment. Integral flow paths molded in the periphery of the seal provide exceptionally fast “out of cushion” stroke reversal without the use of ball checks.
Series J, NFPA Steel Air Cylinders (ø1-1/2” to 12”), Cylinder Features

Series J Cylinders are constructed with the finest materials for each component!

1. **Piston Rod**: Hard chrome plated high-tensile steel, ground and polished.
2. **Rod Bearing**: External removable threaded steel bearing housing (black oxide finish), with an oil-impregnated sintered iron rod bearing.
3. **Rod Seal**: Nitrile lip-type seal is pressure energized and wear compensating for durability and long life.
4. **Head/Cap**: Precision machined from steel, then black oxide finished 1-1/2” to 2-1/2” bores. Painted black finish on 3-1/4” to 12” bores.
5. **Ultra Cushion® Seals**: Advanced design features a unique, one-piece, compound seal of nitrile® captured within a precision machined groove. Linear and radial “float” of the cushion seals eliminates misalignment. Ultra Cushions provide exceptionally fast “out of cushion” stroke reversal. (Head and Cap Cushions are optional.)
   *Nitrile seals on the 5/8” & 1” rod diameter. For rod sizes 1-3/8” and larger, urethane seals are standard.
6. **O-Ring Tube Seal**: Buna is standard. (Viton is optional.)
7. **Tie Rods**: High-strength steel maintains uniform compression on tube end seals.
8. **Piston**: Machined solid steel, for high strength. Threaded piston is installed with high strength threadlocker adhesive then staked to the piston rod.
9. **Adjustable Captive Cushion Needle**: A one-piece, precision threaded brass cushion adjustment screw with a threaded steel capture ring. It provides safe and precise cushion adjustment.
10. **Wiper Seal**: Lip-type urethane wiper seal keeps contaminates from getting into cylinder by aggressively wiping foreign materials from the piston rod, enhancing the rod seal life.
11. **Cylinder Tube**: High-strength aluminum alloy 1-1/2”, 2”, 2-1/2” bore anodized on the O.D. and hard coat I.D. Steel cylinder tube hard chrome plated I.D. 3-1/4” to 12” bore.
12. **Piston Seals**: Long-wearing nitrile seals.
13. **Wear Ring**: Reinforced Teflon® compounded with polyphenylene sulfide provides supreme wear and excellent bearing support.

Application Information

Series J NFPA interchangeable steel air cylinders are offered with a variety of accessories, standard and optional equipment to meet your application needs.

The addition of a Teflon® wear ring to the outer perimeter of the piston permits us to guarantee its operation against failure due to lack of lubrication for ONE FULL YEAR, regardless of cycles! See page ACT-1-98 for complete warranty.

Standard non-cushioned Series J cylinders are recommended for applications that require full bottoming of the piston and where the noise emitted by the metal-to-metal impact between the piston and cylinder end caps is tolerable. We recommend that optional non-adjustable cushions be added for piston speeds (moving light tools) ranging from 15 to 30 in/sec. For speeds exceeding 30 in/sec, the cylinders should be equipped with adjustable air cushions.
Series J, NFPA Steel Air Cylinders (Ø1-1/2" to 12"), Cylinder Features

Series EJ Ecology Cylinders are constructed with the finest materials for each component!

1. **Ultra Cushion® Seals**: Advanced design features a unique, one-piece, compound seal of nitrile* captured within a precision machined groove. Linear and radial “float” of the cushion seals eliminates misalignment. Ultra Cushions provide exceptionally fast “out of cushion” stroke reversal. (Head and Cap Cushions are optional.)

2. **Impact Dampening Piston Seals**: Our impact dampening piston seals, in conjunction with our advanced cushion design, decelerate and reduce end-of-stroke noise.

3. **Piston**: Machined solid steel, for high strength. Threaded piston is installed with high strength threadlocker adhesive then staked to the piston rod.

4. **O-Ring Tube Seal**: Buna is standard. (Viton is optional.)

5. **Adjustable Captive Cushion Needle (not shown)**: Fine thread allows for safe and precision adjustment of cushion. (See page ACT-1-6.)

6. **Wiper Seal**: Lip-type urethane wiper seal keeps contaminants from getting into cylinder by aggressively wiping foreign materials from the piston rod, enhancing the rod seal life.

7. **Piston Rod**: Hard chrome plated high-tensile steel, ground and polished.

8. **Head/Cap**: Precision machined from steel, then black oxide finished 1-1/2" to 2-1/2" bores. Painted black finish 3-1/4" to 12" bores.

9. **Wear Ring**: Reinforced Teflon® compounded with polyphenylene sulfide provides supreme wear and excellent bearing support.

10. **Tie Rods**: High-strength steel maintains uniform compression on tube end seals.


12. **Rod Seal**: Nitrile lip-type seal is pressure energized and wear compensating for durability and long life.

13. **Rod Bearing**: External removable steel bearing housing (black oxide finish), with an oil-impregnated sintered iron rod bearing.
**Norgren Ecology Cylinders offer these advantages:**

1. **Norgren Guarantees Non-lubricated Operation for a Full Year!**
   - The piston rod is self-lubricated by the oil-impregnated rod bearing during operation. Lubrication between piston and cylinder barrel is derived from the polishing qualities of the reinforced Teflon® wear ring.
   - The low friction surfaces extend the life of the seals beyond normal expectations, permitting Norgren to unconditionally guarantee non-lubricated operation for one full year. See page ACT-1-98 for complete warranty.
   - Series EJ cylinders are Norgren interchangeable and are available in many different mounting styles.

2. **Operating Quietly to Meet OSHA Specifications.**
   - Series EJ cylinders provide substantial reductions in impact noise, which reduces overall machine noise and helps meet government regulations.
   - The summary of sound decibels chart illustrates the operating sound levels.
   - The impact damping qualities of the Piston Seals are guaranteed for ONE FULL YEAR!

3. **Energy Absorption Capacity of the Impact Dampening Seals**
   - Usable Pounds Stoppable at the Following Piston Speeds
     - Provides energy absorption characteristics of the impact dampening piston seals with a Non-Adjustable cushion. For higher loads and velocities please refer to the Decel® Air Cushion option on ACT-1-10.

**Energy Absorption Capacity of the Impact Dampening Piston Seals with a Non-Adjustable Cushion.**
- *The weight of the cylinder piston has been deducted from the figures shown above.
- *Note: The use of Viton® Seals limits the absorption of the impact dampening seals by 50%.

**Effect of Impact Dampening Seals on Total Stroke of Cylinders**

**Summary of Sound Levels in Decibels**

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**Energy Absorption Chart.** This allows you to compute the exact cylinder size required by knowing the weight (pounds) you are stopping and are available in many different mounting styles.

**Operating Quietly to Meet OSHA Specifications.**
- Series EJ cylinders provide substantial reductions in impact noise, which reduces overall machine noise and helps meet government regulations.
- The impact dampening qualities of the Piston Seals are guaranteed for ONE FULL YEAR!
Series J & EJ, NFPA Steel Air Cylinders (ø1-1/2” to 12”), Technical Features

Cushion Function

As the cushion spear enters the cushion cavity, the exhaust port becomes sealed off creating an air brake. This provides the initial deceleration in piston speed. The oversized air cushion bleed orifice permits the cushion pressure to exhaust with minimal restriction. This allows the piston to move quickly and smoothly through the cushion length.

As the piston continues its travel to the point of impact with the end caps, the compressive qualities of the EJ seal provide the final decelerating force. This action compresses the EJ seal and absorbs the remaining kinetic shock vibration and noise created by the impact.

On the reverse stroke the EJ seal releases its compressive energy to propel the piston away from the end caps, producing an immediate breakaway.

Operating Temperatures:

- Series J: -20°F to 200°F (-29°C to 107°C)
- with Viton Seals: -20°F to 400°F (-29°C to 204°C)

Operating Pressure:

- 250 PSIG Air (17.2 Bar)
- 400 PSIG Hydraulic (27.6 Bar)


Supply:

Filtered compressed air to 250 PSI Petroleum based hydraulic fluid to 400 PSI

Lubrication:

None required

Norgren Air Cylinders are rated for “no lube added” service. All internal components are lubricated at time of assembly with a Teflon® based grease.

Materials:

- Head and End Caps: precision machined steel
- Tube: 6063-T832 aluminum, clear anodized O.D., hard coat anodized I.D.
- Rod: hard chrome plated steel
- Piston: machined high-strength aluminum alloy
- Rod Bearing: oil impregnated sintered iron
- Seals: nitrile rod seal, urethane rod wiper, nitrile piston seals, nitrile tube end seals
- Tie Rods: high-tensile strength steel

Air Cylinder Selection:

The proper application and selection of an air cylinder requires full consideration of the following: the fluid medium, operating pressures, mounting style, length of stroke, type of rod connection to the load, thrust or mounting tension on the rod, mounting attitude, speed of the stroke and how the load motion will be stopped.

The data that follows provides the necessary information in the evaluation of an average application and will help you in selecting the proper cylinder model and size for your particular application.

Note: 1-1/2", 2", 2-1/2", 3-1/4", 4" and 5" bore cylinders with 1/2" to 2" strokes will be furnished with a short head cushion sleeve and short cap cushion spear. Only available on 5/8" and 1" rods.

The above specification applies to Series J cylinders with optional non-adjustable or adjustable cushions.

Ultra Cushion®

A Major Design and Performance Breakthrough in Air Cylinder Cushioning Systems!

Norgren’s advanced cushion design features a unique, one-piece, nitrile compound seal that is captured within a precision machined groove. This allows both linear and radial “float” of the cushion seal which virtually eliminates problems associated with misalignment. Integral flow paths molded in the periphery of the seal provide exceptionally fast “out of cushion” stroke reversal without the use of ball checks.
Decel-Air™ Cushioned Cylinder

Eliminates the need for shock absorbers on air cylinder applications.

Explanation of Decel-Air Cushion:

Norgren’s Decel Cushioned cylinder was designed for applications where high velocity, low mass, material transfer or machine function is required, and where the kinetic energy to be absorbed during cushioning exceeds the parameters of our standard Series EA or EJ air cylinders equipped with non-adjustable or adjustable cushions. Decel cushions employ longer-than-standard air cushions to assist our Impact Dampening Piston Seal.

Why does our Decel-Air Cushion work?
The extra cushion length of the Decel cushioned cylinder provides an additional deceleration capability to slow the cylinder’s moving mass to a point where the positive cushioning effect of our Impact Dampening Piston Seals can perform the final cushioning.

Norgren’s Decel-Air Cushioned Cylinders Versus Cylinder Mounted Shock Absorbers

The first extensive evaluation of pneumatic cylinder cushion performance was undertaken by the Mechanical Engineering Department of The Ohio State University. The test was conducted on 2-1/2” bore, 12” stroke. The OSU tests found the Decel Cushioned cylinders absorbed almost three times as much kinetic energy with a lower level of peak cushion as a standard Ecology seal configured cylinder.

Because air is compressible and is exhausted out of the cylinder each cycle, the internal heat buildup is minimized. The “Maximum Inch Pounds Per Hour” rating which is essential in determining the effectiveness of shock absorber performance is not needed to judge Decel cushion performance.

The test indicated that Norgren Decel-Air Cushioned cylinders could prove to be superior to a hydraulic shock absorber assisted cylinder for high cycle, high velocity applications with light to moderate loading (precisely the area where most severe cylinder applications exist). The cycle rates and the cushioning times of the Decel-Air Cushioned cylinders and the hydraulic shock absorber assisted cylinders were comparable.*

Decel-Air Cushioned cylinders are also less costly than shock absorber mounted cylinders and are self-contained units.

* For comparative evaluation, a well-known hydraulic shock absorber was chosen. The OSU tests showed a smooth shock-absorbing operation was achieved at very low velocities using the shock absorbers, but at comparable Decel Cushion cylinder velocities, a high mechanical impact took place on the shock absorber mounted cylinder.

Potential Decel-Air Cushion Applications

1. Conveyors & Material Handling Equipment
2. Transfer Machines & Shuttle Tables
3. Packaging Machinery
4. Foundry Equipment
5. Automatic Gate Opening & Closing
The Decel Cushioned cylinder increases the kinetic energy absorption capability by increasing the effective cushion spear length in the cylinder.

The Decel Cushioned cylinder increases the standard cushion spear length by 100%, allowing an increase in kinetic energy absorption capability by two times.

Decel Cushioned Cylinder
Fully Cushioned Load Stopping Capacity in Pounds*

<table>
<thead>
<tr>
<th>In/Sec</th>
<th>Cylinder Bore</th>
<th>Piston Rod Dia. Weights*</th>
</tr>
</thead>
<tbody>
<tr>
<td>1-1/2</td>
<td>1-1/2 1-1/2 1 5-5/8</td>
<td>5/8” - .30 lb. + 0.09 lb./in. stroke</td>
</tr>
<tr>
<td>2</td>
<td>1-1/2 1 5-5/8</td>
<td>1” - .90 lb. + 0.22 lb./in. stroke</td>
</tr>
<tr>
<td>2-1/2</td>
<td>1-1/2 1 5-3/4</td>
<td>1-3/8” - 2.2 lb. + 0.42 lb./in. stroke</td>
</tr>
<tr>
<td>3-1/4</td>
<td>1-3/4 1-1/4 6-3/4</td>
<td>1-3/4” - 4.0 lb. + 0.68 lb./in. stroke</td>
</tr>
<tr>
<td>4</td>
<td>1-3/4 1-1/4 6-3/4</td>
<td>2” - 5.5 lb. + 0.90 lb./in. stroke</td>
</tr>
<tr>
<td>5</td>
<td>1-3/4 1-1/4 7</td>
<td>2-1/2” - 10.1 lb. + 1.40 lb./in. stroke</td>
</tr>
</tbody>
</table>

Piston Rod Dia. Weights*:
- 5/8” - .30 lb. + 0.09 lb./in. stroke
- 1” - .90 lb. + 0.22 lb./in. stroke
- 1-3/8” - 2.2 lb. + 0.42 lb./in. stroke
- 1-3/4” - 4.0 lb. + 0.68 lb./in. stroke
- 2” - 5.5 lb. + 0.90 lb./in. stroke

Double Weight for double rod end cylinders

* Include piston rod weight in total load to be stopped.

The Decel Cushioned cylinder increases the kinetic energy absorption capability by increasing the effective cushion spear length in the cylinder.

The Decel Cushioned cylinder increases the standard cushion spear length by 100%, allowing an increase in kinetic energy absorption capability by two times.

Decel Cushioned cylinder envelope dimensions are not NFPA dimensionally interchangeable over the stroke length.

NOTE: See page ACT-1-8 for “Effect of Impact Dampening Seals on Total Stroke of Cylinders,” and page ACT-1-19 for Rod End Dimensions.
Tests by the Milwaukee School of Engineering confirm Ecology Cylinder Cushions are more efficient, faster acting and bounce less!

NORGREN ECOLOGY CYLINDERS with Non-Adjustable Cushions

2" Bore Rod End Cushion Test
Average deceleration force = 15 Gs
Time consumed during cushioning = 0.030 sec.
Number of bounces: 1 Pneumatic – 1 Metallic

<table>
<thead>
<tr>
<th>Cylinders with Cushions</th>
<th>Weight attached to Piston Rod (lbs)</th>
<th>Cushion Efficiency (G's * Created)</th>
<th>Cushioning Time (Ms)</th>
<th>Bounce Cycles During Cushioning</th>
</tr>
</thead>
<tbody>
<tr>
<td>Norgren Ecology Adjustable</td>
<td>8.5</td>
<td>14.50</td>
<td>25.00</td>
<td>1.00</td>
</tr>
<tr>
<td>Norgren Ecology Non-Adjustable</td>
<td>8.5</td>
<td>17.50</td>
<td>26.25</td>
<td>1.75</td>
</tr>
<tr>
<td>Competitor A Adjustable</td>
<td>8.5</td>
<td>48.00</td>
<td>107.50</td>
<td>7.25</td>
</tr>
<tr>
<td>Competitor B Adjustable</td>
<td>8.5</td>
<td>32.75</td>
<td>102.50</td>
<td>6.50</td>
</tr>
<tr>
<td>Competitor C Adjustable</td>
<td>8.5</td>
<td>50.50</td>
<td>81.25</td>
<td>9.25</td>
</tr>
</tbody>
</table>

NORGREN ECOLOGY CYLINDERS with Adjustable Cushions

2" Bore Rod End Cushion Test
Average deceleration force = 20 Gs
Time consumed during cushioning = 0.015 sec.
Number of bounces: 1/2 Pneumatic – 0 Metallic

<table>
<thead>
<tr>
<th>Cylinders with Cushions</th>
<th>Weight attached to Piston Rod (lbs)</th>
<th>Cushion Efficiency (G's * Created)</th>
<th>Cushioning Time (Ms)</th>
<th>Bounce Cycles During Cushioning</th>
</tr>
</thead>
<tbody>
<tr>
<td>Norgren Ecology Adjustable</td>
<td>34</td>
<td>5.25</td>
<td>40.00</td>
<td>3.25</td>
</tr>
<tr>
<td>Norgren Ecology Non-Adjustable</td>
<td>34</td>
<td>12.00</td>
<td>28.75</td>
<td>2.75</td>
</tr>
<tr>
<td>Competitor A Adjustable</td>
<td>34</td>
<td>11.50</td>
<td>92.50</td>
<td>6.75</td>
</tr>
<tr>
<td>Competitor B Adjustable</td>
<td>34</td>
<td>8.00</td>
<td>77.50</td>
<td>5.25</td>
</tr>
<tr>
<td>Competitor C Adjustable</td>
<td>34</td>
<td>6.50</td>
<td>67.50</td>
<td>6.25</td>
</tr>
</tbody>
</table>

COMPETITIVE CYLINDERS with Adjustable Cushions

2" Bore Rod End Cushion Test
Average deceleration force = 70 Gs
Time consumed during cushioning = 0.120 sec.
Number of bounces: 2 Pneumatic – 4 Metallic

<table>
<thead>
<tr>
<th>Cylinders with Cushions</th>
<th>Weight attached to Piston Rod (lbs)</th>
<th>Cushion Efficiency (G's * Created)</th>
<th>Cushioning Time (Ms)</th>
<th>Bounce Cycles During Cushioning</th>
</tr>
</thead>
<tbody>
<tr>
<td>Norgren Ecology Adjustable</td>
<td>8.5</td>
<td>14.50</td>
<td>20 in/sec.</td>
<td>14.5 lbs. added to rod</td>
</tr>
<tr>
<td>Norgren Ecology Non-Adjustable</td>
<td>8.5</td>
<td>17.50</td>
<td>26.25</td>
<td>14.5 lbs. added to rod</td>
</tr>
</tbody>
</table>

2" Bore Cap End Cushion Test
Average deceleration force = 17.5 Gs
Time consumed during cushioning = 0.025 sec.
Number of bounces: 1 Pneumatic – 1 Metallic

<table>
<thead>
<tr>
<th>Cylinders with Cushions</th>
<th>Weight attached to Piston Rod (lbs)</th>
<th>Cushion Efficiency (G's * Created)</th>
<th>Cushioning Time (Ms)</th>
<th>Bounce Cycles During Cushioning</th>
</tr>
</thead>
<tbody>
<tr>
<td>Norgren Ecology Adjustable</td>
<td>8.5</td>
<td>14.50</td>
<td>20 in/sec.</td>
<td>14.5 lbs. added to rod</td>
</tr>
<tr>
<td>Norgren Ecology Non-Adjustable</td>
<td>8.5</td>
<td>17.50</td>
<td>26.25</td>
<td>14.5 lbs. added to rod</td>
</tr>
</tbody>
</table>

4" Bore Cylinder Tests Results

Figures shown are average and not the result of each individual test. Piston velocity was regulated at 45 in/sec.

<table>
<thead>
<tr>
<th>Cylinders with Cushions</th>
<th>Weight attached to Piston Rod (lbs)</th>
<th>Cushion Efficiency (G's * Created)</th>
<th>Cushioning Time (Ms)</th>
<th>Bounce Cycles During Cushioning</th>
</tr>
</thead>
<tbody>
<tr>
<td>Norgren Ecology Adjustable</td>
<td>54</td>
<td>5.25</td>
<td>40.00</td>
<td>3.25</td>
</tr>
<tr>
<td>Norgren Ecology Non-Adjustable</td>
<td>54</td>
<td>12.00</td>
<td>28.75</td>
<td>2.75</td>
</tr>
<tr>
<td>Competitor A Adjustable</td>
<td>54</td>
<td>11.50</td>
<td>92.50</td>
<td>6.75</td>
</tr>
<tr>
<td>Competitor B Adjustable</td>
<td>54</td>
<td>8.00</td>
<td>77.50</td>
<td>5.25</td>
</tr>
<tr>
<td>Competitor C Adjustable</td>
<td>54</td>
<td>6.50</td>
<td>67.50</td>
<td>6.25</td>
</tr>
</tbody>
</table>

* Measured in G's of deceleration force created. All cylinders tested were NFPA types, front flange mounting, 6” stroke with standard diameter piston rods.
### Cylinder Force and Volume Charts

**Extend Forces in pounds (newtons)**

<table>
<thead>
<tr>
<th>Bore</th>
<th>Piston Area</th>
<th>PSI (bar)</th>
<th>Volume Qu R (cm³) Displacement Per Inch</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>40 (3)</td>
<td>60 (4)</td>
</tr>
<tr>
<td>1 1/2&quot;</td>
<td>1.77 (11.40)</td>
<td>106 (472)</td>
<td>142 (629)</td>
</tr>
<tr>
<td>2&quot;</td>
<td>3.14 (20.27)</td>
<td>189 (839)</td>
<td>251 (1119)</td>
</tr>
<tr>
<td>2 1/2&quot;</td>
<td>4.91 (31.67)</td>
<td>295 (1311)</td>
<td>393 (1748)</td>
</tr>
<tr>
<td>3 1/4&quot;</td>
<td>8.30 (53.32)</td>
<td>464 (2215)</td>
<td>664 (2953)</td>
</tr>
<tr>
<td>4&quot;</td>
<td>12.57 (81.07)</td>
<td>754 (3355)</td>
<td>1005 (4473)</td>
</tr>
<tr>
<td>5&quot;</td>
<td>19.64 (126.71)</td>
<td>1178 (5240)</td>
<td>1571 (6988)</td>
</tr>
<tr>
<td>6&quot;</td>
<td>28.27 (182.39)</td>
<td>1696 (7544)</td>
<td>2262 (10061)</td>
</tr>
<tr>
<td>7&quot;</td>
<td>38.49 (247.91)</td>
<td>2309 (10242)</td>
<td>3079 (13658)</td>
</tr>
<tr>
<td>8&quot;</td>
<td>50.26 (324.26)</td>
<td>3015 (13411)</td>
<td>4020 (17881)</td>
</tr>
<tr>
<td>10&quot;</td>
<td>78.54 (506.74)</td>
<td>4712 (20961)</td>
<td>6283 (27948)</td>
</tr>
<tr>
<td>12&quot;</td>
<td>113.10 (729.72)</td>
<td>6786 (30184)</td>
<td>9048 (40246)</td>
</tr>
</tbody>
</table>

### Deduct these Forces for Retract Strokes

<table>
<thead>
<tr>
<th>Rod</th>
<th>Rod Area</th>
<th>PSI (bar)</th>
<th>Volume Qu R (cm³) Displacement Per Inch</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>40 (3)</td>
<td>60 (4)</td>
</tr>
<tr>
<td>5/8&quot;</td>
<td>.307 (1.98)</td>
<td>12 (53)</td>
<td>18 (80)</td>
</tr>
<tr>
<td>1&quot;</td>
<td>.785 (5.06)</td>
<td>31 (138)</td>
<td>47 (209)</td>
</tr>
<tr>
<td>1 3/8&quot;</td>
<td>1.485 (9.58)</td>
<td>59 (262)</td>
<td>89 (396)</td>
</tr>
<tr>
<td>1 1/4&quot;</td>
<td>2.404 (15.51)</td>
<td>96 (423)</td>
<td>144 (641)</td>
</tr>
<tr>
<td>2&quot;</td>
<td>3.142 (20.16)</td>
<td>126 (559)</td>
<td>189 (839)</td>
</tr>
<tr>
<td>2 1/2&quot;</td>
<td>4.909 (31.67)</td>
<td>196 (873)</td>
<td>295 (1310)</td>
</tr>
</tbody>
</table>

### Bore Size Selection:

Use the following formulas in the selection of the proper bore size:

- Extended force in pounds = Bore area (in²) times pressure to cap in psig.
- Retract force in pounds = Bore area minus rod area (in²) times pressure to head in psig.

### Bore Areas

<table>
<thead>
<tr>
<th>Cylinder Bore</th>
<th>Area (sq. in.)</th>
</tr>
</thead>
<tbody>
<tr>
<td>1 1/2&quot;</td>
<td>1.77</td>
</tr>
<tr>
<td>2&quot;</td>
<td>3.14</td>
</tr>
<tr>
<td>2 1/2&quot;</td>
<td>4.91</td>
</tr>
<tr>
<td>3 1/4&quot;</td>
<td>8.30</td>
</tr>
<tr>
<td>4&quot;</td>
<td>12.57</td>
</tr>
<tr>
<td>5&quot;</td>
<td>19.64</td>
</tr>
<tr>
<td>6&quot;</td>
<td>28.27</td>
</tr>
<tr>
<td>7&quot;</td>
<td>38.49</td>
</tr>
<tr>
<td>8&quot;</td>
<td>50.26</td>
</tr>
<tr>
<td>10&quot;</td>
<td>78.54</td>
</tr>
<tr>
<td>12&quot;</td>
<td>113.10</td>
</tr>
</tbody>
</table>

### Rod Areas

<table>
<thead>
<tr>
<th>Rod Diameter</th>
<th>Area (sq. in.)</th>
</tr>
</thead>
<tbody>
<tr>
<td>5/8&quot;</td>
<td>0.31</td>
</tr>
<tr>
<td>1&quot;</td>
<td>0.78</td>
</tr>
<tr>
<td>1 3/8&quot;</td>
<td>1.49</td>
</tr>
<tr>
<td>1 1/4&quot;</td>
<td>2.41</td>
</tr>
<tr>
<td>2&quot;</td>
<td>3.14</td>
</tr>
<tr>
<td>2 1/2&quot;</td>
<td>4.91</td>
</tr>
</tbody>
</table>

**NOTE:**
- A & EA Rod Dia. (5/8" – 1 3/4")
- J & EJ Rod Dia. (5/8" – 2 1/2")
**Piston Rod Diameter Selection:**

Applications requiring long extend (push) strokes may require oversize piston rod diameters to prevent buckling.

To determine the correct rod diameter for your application follow these simple steps:

1. Select the thrust from the Cylinder Force and Volume Chart (page ACT-1-13) that is required for your application.
   
   Thrust = Piston Surface Area x Operating Pressure

2. From the Cylinder Mounting Diagram Chart (page ACT-1-15) select the mounting style being used.

3. With the piston rod fully extended, calculate the value of \( L \) (in inches). Multiply cylinder stroke by appropriate stroke factor located in Cylinder Mounting Diagram Chart to obtain effective length \( L \).

4. Locate the value of \( L \) (in inches) from the Determining Adequate Rod Diameter Chart.

5. Selecting Stop Tubes: Stop tubes enhance the transverse load carrying capability of a long stroke cylinder by increasing the distance between the piston and rod bearing at full extension (Refer to page ACT-1-87). When the value of \( L \) (calculated from the Adequate Rod Diameter Chart) is less than 40", a stop tube is not required. However, if \( L \) is 40" or more, 1" of stop tube is recommended for every 10" (or fraction thereof) over 40".

6. Recommended Mounting Styles for Maximum Stroke and Thrust Load:
   
   - Multiply cylinder stroke by appropriate stroke factor to obtain effective length \( L \).
   - If cylinder has extra rod extension, add this extension to the stroke length before obtaining effective length.

---

**Determined Adequate Rod Diameter Chart**

<table>
<thead>
<tr>
<th>Extended Force (lbs)</th>
<th>Maximum effective length “L” recommended for rod diameters</th>
</tr>
</thead>
<tbody>
<tr>
<td>50</td>
<td>95</td>
</tr>
<tr>
<td>100</td>
<td>65</td>
</tr>
<tr>
<td>150</td>
<td>50</td>
</tr>
<tr>
<td>200</td>
<td>43</td>
</tr>
<tr>
<td>300</td>
<td>34</td>
</tr>
<tr>
<td>500</td>
<td>25</td>
</tr>
<tr>
<td>750</td>
<td>20</td>
</tr>
<tr>
<td>1000</td>
<td>17</td>
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<td>1500</td>
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</tr>
<tr>
<td>2000</td>
<td>11</td>
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<td>3000</td>
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</tr>
<tr>
<td>10000</td>
<td>-</td>
</tr>
<tr>
<td>12500</td>
<td>-</td>
</tr>
<tr>
<td>15000</td>
<td>-</td>
</tr>
<tr>
<td>20000</td>
<td>-</td>
</tr>
</tbody>
</table>

**Tie Rod Tightening:**

In order to reduce the possibility of cylinder binding or damage, tighten to quarter unit increments of the final torque value in the following order: #1, #2, #3, #4.

Then torque fully to the recommended foot pounds in the same order.

---

**Recommended Torques for Tightening Tie Rods**

<table>
<thead>
<tr>
<th>Cylinder Bore</th>
<th>Standard Steel Tie Rods</th>
<th>Stainless Steel Tie Rods</th>
</tr>
</thead>
<tbody>
<tr>
<td>1-1/2“</td>
<td>6.6 ft. lbs.</td>
<td>3.75 ft. lbs.</td>
</tr>
<tr>
<td>2“</td>
<td>11 ft. lbs.</td>
<td>7.5 ft. lbs.</td>
</tr>
<tr>
<td>2-1/2“</td>
<td>13 ft. lbs.</td>
<td>7.5 ft. lbs.</td>
</tr>
<tr>
<td>3-1/4“</td>
<td>20 ft. lbs.</td>
<td>13-14 ft. lbs.</td>
</tr>
<tr>
<td>4“</td>
<td>24 ft. lbs.</td>
<td>13-14 ft. lbs.</td>
</tr>
<tr>
<td>5“</td>
<td>40 ft. lbs.</td>
<td>33 ft. lbs.</td>
</tr>
<tr>
<td>6“</td>
<td>48 ft. lbs.</td>
<td>33 ft. lbs.</td>
</tr>
<tr>
<td>7” &amp; 8“</td>
<td>100 ft. lbs.</td>
<td>65 ft. lbs.</td>
</tr>
<tr>
<td>10“</td>
<td>150 ft. lbs.</td>
<td>75 ft. lbs.</td>
</tr>
<tr>
<td>12“</td>
<td>175 ft. lbs.</td>
<td>87.5 ft. lbs.</td>
</tr>
</tbody>
</table>
### Cylinder Mounting Diagram Chart

<table>
<thead>
<tr>
<th>Cylinder Mounting</th>
<th>Rod End Connection</th>
<th>Example</th>
<th>Stroke Factor</th>
</tr>
</thead>
<tbody>
<tr>
<td>Side Tapped, Head or Cap Flange, Tie Rod,</td>
<td>Fixed and Rigidly Guided</td>
<td><img src="image1" alt="Diagram" /></td>
<td>.50</td>
</tr>
<tr>
<td>Center or Side Lug</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Side Tapped, Head or Cap Flange, Tie Rod,</td>
<td>Pivoted and Rigidly Guided</td>
<td><img src="image2" alt="Diagram" /></td>
<td>.70</td>
</tr>
<tr>
<td>Center or Side Lug</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Side Tapped, Head or Cap Flange, Tie Rod,</td>
<td>Supported but not Rigidly Guided</td>
<td><img src="image3" alt="Diagram" /></td>
<td>2.00</td>
</tr>
<tr>
<td>Center or Side Lug</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Side Tapped, Head or Cap Flange, Tie Rod,</td>
<td>None</td>
<td><img src="image4" alt="Diagram" /></td>
<td>5.00</td>
</tr>
<tr>
<td>Center or Side Lug</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Head Trunnion</td>
<td>Pivoted and Rigidly Guided</td>
<td><img src="image5" alt="Diagram" /></td>
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<tr>
<td>Center Trunnion</td>
<td>Pivoted and Rigidly Guided</td>
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<td>Cap Trunnion or Clevis</td>
<td>Pivoted and Rigidly Guided</td>
<td><img src="image7" alt="Diagram" /></td>
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</tbody>
</table>

### Tie Rod Supports:
For long strokes, tie rod supports are provided. These supports are of the same envelope dimensions as the cylinder end caps.

**NOTE:** See chart for number of tie rod supports required.

### Number of Tie Rod Supports Required

<table>
<thead>
<tr>
<th>Cylinder Bore</th>
<th>Cylinder Stroke (in)</th>
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<td>60</td>
<td>75</td>
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<td>1-1/2&quot;</td>
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<td>3-1/4&quot;</td>
<td>-</td>
</tr>
<tr>
<td>4&quot;</td>
<td>-</td>
</tr>
<tr>
<td>5&quot; and over</td>
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</table>
### Series A & EA Cylinder Weights

**In pounds (Kilograms)**

<table>
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<tr>
<th>Bore inch (mm)</th>
<th>Rod Inch (mm)</th>
<th>01, 05, 16</th>
<th>03</th>
<th>04</th>
<th>06</th>
<th>07, 09, 09</th>
<th>11</th>
<th>12</th>
<th>15</th>
<th>20, 21, 22</th>
<th>32</th>
<th>10, 42, 52</th>
<th>Add Per Inch of Stroke</th>
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<tbody>
<tr>
<td>1 1/2&quot; (38.1)</td>
<td>5/8&quot; (15.88)</td>
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<td>1.77</td>
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<td>1.59</td>
<td>3.3</td>
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<td>4.0</td>
<td>1.81</td>
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### Series J & EJ Cylinder Weights

**In pounds (kilograms)**

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<th>Bore inch (mm)</th>
<th>Rod Inch (mm)</th>
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<th>03</th>
<th>04</th>
<th>06</th>
<th>07, 09, 09</th>
<th>11</th>
<th>12</th>
<th>15</th>
<th>20, 21, 22</th>
<th>32</th>
<th>10, 42, 52</th>
<th>Add Per Inch of Stroke</th>
</tr>
</thead>
<tbody>
<tr>
<td>1 1/2&quot; (38.1)</td>
<td>5/8&quot; (15.88)</td>
<td>1.9</td>
<td>1.86</td>
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<td>1.10</td>
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<td>1.27</td>
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<tr>
<td>2&quot; (50.8)</td>
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<td>1.27</td>
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<td>4.0</td>
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<td>3.3</td>
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<td>1.81</td>
</tr>
<tr>
<td>1 1/2&quot; (38.1)</td>
<td>5/8&quot; (15.88)</td>
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<td>4.1</td>
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<td>1.59</td>
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<td>17.1</td>
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<tr>
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<td>28.7</td>
<td>17.33</td>
<td>49.0</td>
<td>29.3</td>
</tr>
</tbody>
</table>

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*All Dimensions in Inches (mm)*

*Technical Information*

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*Series J & EJ, NFPA Steel Air Cylinders (1/2" to 12") Technical Information*
Breakaway Pressures

An average of 5 pounds (psig) is necessary to breakaway non-cushioned Series J air cylinders when mounted horizontally with no load on the piston rod. Double rod end cylinders require an average of 7 pounds (psig).

An average of 6 pounds (psig) is required to breakaway single rod and Series A & J and Series EA & EJ air cylinders equipped with optional non-adjustable air cushions. Double rod end cylinders require an average of 8 pounds (psig).

These figures are for non-cushioned cylinders with strokes of 6 inches or less with factory lubrication. Consult the factory if your application requires a lower breakaway pressure or a guaranteed minimum breakaway.

Series A & J cylinders with 3-1/4" thru 12" diameter pistons are counterbored to provide a larger area for the pressure to act upon.

Listed are the average breakaway pressures in PSI for all Series J & EJ Cylinders. If your application requires a lower breakaway pressure than indicated for a particular bore size, consult the factory.

Breakaway Pressures in PSI

<table>
<thead>
<tr>
<th>Bore</th>
<th>Series A</th>
<th>Low Friction Seals (LF)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Extend</td>
<td>Retract</td>
</tr>
<tr>
<td>11/2&quot;, 2&quot;</td>
<td>5</td>
<td>6</td>
</tr>
<tr>
<td>31/4&quot;, 4&quot;</td>
<td>4</td>
<td>5</td>
</tr>
<tr>
<td>5&quot;, 6&quot;, 7&quot;, 8&quot;</td>
<td>3</td>
<td>4</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Bore</th>
<th>Series J</th>
<th>Low Friction Seals (LF)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Extend</td>
<td>Retract</td>
</tr>
<tr>
<td>11/2&quot;, 2&quot;, 21/2&quot;</td>
<td>5</td>
<td>6</td>
</tr>
<tr>
<td>31/4&quot;, 4&quot;</td>
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<td>5&quot;, 6&quot;, 7&quot;, 8&quot;</td>
<td>3</td>
<td>4</td>
</tr>
<tr>
<td>10&quot;</td>
<td>3</td>
<td>4</td>
</tr>
<tr>
<td>12&quot;</td>
<td>3</td>
<td>4</td>
</tr>
</tbody>
</table>

Note: Breakaway pressures were established with the cylinders mounted horizontally and no load on the piston rod.
**Series A & EA, NFPA Aluminum Air Cylinders (ø1-1/2 to 8")**

- NFPA (MS4) 01 Side Tapped Mount for 1-1/2" to 6" bore sizes.
- Series A & J Cylinders rated to 250 PSI air, 400 PSI hydraulic (non-shock).
- Series EA & EJ Cylinders rated to 250 PSI air only.
- Designed for non-lube service.
- Switches available on all bore sizes. (See pages ACT-1-90 & 91 for ordering information.)

### Cylinder Order Information

<table>
<thead>
<tr>
<th>Bore and Stroke (write out)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
</tr>
</tbody>
</table>

### Mounting Options

| 01 | Side Tapped (MS4) |
| 03 | Head Rectangular Flange (MF1) |
| 04 | Cap Rectangular Flange (MF2) |
| 05 | Basic Cylinder No Mounting (MX0) |
| 06 | Both Ends (4) Tie Rods Ext. (MX1) |
| 07 | Both Ends (2) Tie Rods Ext. (MX2) |
| 08 | Cap Tie Rods Ext. (MX3) |
| 09 | Head Tie Rods Ext. (MX3) |
| 10 | Removable Head Trunnion (MT1) - A & EA |
| 11 | Head End Angles (MS1) |
| 12 | Cap Fixed Clevis (MP1) |
| 13 | Cap End Angles (MS7) |
| 14 | Sleeve Nut Construction (Universal) |
| 15 | Head Square Flange (MF5) |
| 16 | Cap Square Flange (MF6) |
| 17 | Cap Fixed Eye (MP3) |
| 19 | Detachable Cap Eye (MP4) |
| 21 | Detachable Cap Eye (MP4) |
| 22 | Spherical Bearing |
| 23 | Base Bar (Not NFPA - A & EA Only) |

### Cushion in Head

| 3 | None |
| 5 | Non-Adjustable Cushion |
| 7 | Adjustable Cushion (Position 2) |
| 9 | Decal Cushion |

### Cushion in Cap

| 3 | None |
| 5 | Non-Adjustable Cushion |
| 7 | Adjustable Cushion (Position 2) |
| 9 | Decal Cushion |

### Additional Options – order alphabetically – More on page ACT-1-95

- **HR** Case Härder (45 Rc)
- **L** Port Location position 1 standard: L(Head Cap) (specify position 1 thru 4 for head and/or cap)
- **MS** Metal Rod Scraper
- **N** Cushion Adjust Screw Location position 2 standard: N(Head Cap) (specify position 1 thru 4 for head and/or cap)
- **P** Non-Standard Port Sizes: [specify port size for P( _H) head only, P( _C) cap only, or P( _H) both head & cap]
- **PS** Magnetic Piston – includes aluminum tube option for J & EJ - Std. for Alum
- **RS** Rod Stud Type 1 (5/8" – 1 3/4" ø Rod)
- **RX** Rod Extensions (specify length of additional rod extension)
- **SC** Single Acting Spring Extend (Cap End) – See page ACT-1-86
- **SR** Single Acting Spring Retract (Rod End) – See page ACT-1-86
- **SS** Stainless Steel (Hard Chrome Plated)
- **ST** Stop Tube (Cap End) (specify stop tube length)
- **STR** Stop Tube (Rod End) (specify stop tube length)
- **T** Special Rod Threads (specify rod thread)
- **TK** Thrust Key
- **TX** Thread Extensions (specify length of thread extension)
- **V** Viton® Seals

*1 1/2", 2", 2 1/2" bore cylinders have 3/8" NPT Standard, 1/2" NPT oversize. 3 1/4", 4", 5" bore cylinders have 1/2" NPT Standard, 3/4" NPT oversize. This will add 1/8" to the overall cylinder length.*

### Piston Rod Threads Type

| 1 | Small Male (Solid) |
| 2 | Intermediate Thread Male (Solid) |
| 3 | Female |
| 6 | Full Thread Male (Solid) |
| 7 | Plain Rod End |

### Piston Rod Diameters

| A | 5/8" Standard on 1 1/2", 2", 2 1/2" |
| B | 1" Standard on 3 1/4", 4", 5" |
| C | 1 1/4" Oversized on 3 1/4", 4", 5" |
| D | 1 1/4" Standard on 6", 7", 8" |
| E | 2" Standard on 10" |
| F | 2 1/2" Oversized on 10", 12" |

### Port and Cushion Adjustment Positions (As viewed from rod end: Port standard position 1, Cushion Adjustment standard position 2.)

| 1 | Port Location |
| 2 | Cushion Location |
| 3 | Decal Cushion |
| 4 | Standard with EA & EJ |

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See page ACT-1-96 for complete instructions on how to order cylinders.
Series A & EA, NFPA Aluminum Air Cylinders (ø1-1/2 to 8")
Series J & EJ, NFPA Steel Air Cylinders (ø1-1/2 to 12")

- NFPA (MS4) 01 Side Tapped Mount for 7" to 12" bore sizes.
- Series A & J Cylinders rated to 250 PSI air, 400 PSI hydraulic (non-shock).
- Series EA & EJ Cylinders rated to 250 PSI air only.
- Designed for non-lube service.
- Switches available on all bore sizes. (See pages ACT-1-90 & 91 for ordering information.)

Cylinder with 01 (MS4) Sided Tapped

Cylinder Order Information

01 - - - -

Bore and Stroke (write out)

Additional Options – order alphabetically – More on page ACT-1-96
HR Case Hardened (45 Rc)
L(____) Port Location position 1 standard: L(Head Cap)
N(____) Cushion Adjust Screw Location position 2 standard: N(Head Cap) (specify position 1 thru 4 for head and/or cap)
MS Metal Rod Scraper
P(____) Non-Standard Port Sizes: [specify port size for P(____) head only, P(____) cap only, or P(____) both head & cap]
PS Magnetic Piston – includes aluminum tube option for J & EJ - Std. for Alum
RS Rod Stud
Type 1 (5/8” – 1 3/4” ø Rod)
Type 2 (5/8” & 1” ø Rod)
RX Rod Extensions (specify length of additional rod extension)
SC Single Acting Spring Extend (Cap End) – See page ACT-1-86
SR Single Acting Spring Retract (Rod End) – See page ACT-1-86
SS 303 Stainless Steel (Hard Chrome Plated)
ST(____) Stop Tube (Cap End) (specify stop tube length)
ST(____) Stop Tube (Rod End) (specify stop tube length)
T Special Rod Threads (specify rod thread)
TK Thrust Key
TX Thread Extensions (specify length of thread extension)
V Viton® Seals

Mounting Options
01 Side Tapped (MS4)
03 Head Rectangular Flange (MF1)
03 Head Square (MF2) – 7" to 12" Bore sizes
04 Cap Rectangular Flange (MF2)
04 Cap Square (MF4) – 7" to 12" Bore sizes
05 Basic Cylinder No Mounting (MX0)
06 Both Ends (4) Tie Rods Ext. (MX1)
08 Both Ends (2) Tie Rods Ext. (MX4)
6C Cap Tie Rods Ext. (MX2)
6R Head Tie Rods Ext. (MX3)
7R Removable Head Trunion (MT1) - A & EA
07 Head Trunion (MT1) - J & EJ
08 Cap Trunion (MT2) - A & EA
09 Side Lugs (MS2)
10 Center Trunion (MT4)
11 Side End Angles (MS1)
12 Cap Fixed Clevis (MP1)
14 Side Lugs (MS7)
15 Side End Angles (MS1)
16 Sleeve Nut Construction (Universal)
20 Head Square Range (MRP)
21 Cap Square Range (MRP)
22 Detachable Cap Clevis (MP2)
22 Cap Fixed Eye (MP3)
24 Detachable Cap Eye (MP4)
52 Spherical Bearing
60 Base Bar (Not NFPA - A & EA Only)

See page ACT-1-96 for complete instructions on how to order cylinders.
### Standard & Optional Rod Ends

#### Type 1 Solid
- **(Small Male)**

#### Type 1 Studded
- **(Studded Male Optional)**

#### Type 2 Studded
- **(Intermediate Thread Male Optional)**

#### Type 2 Solid
- **(Intermediate Thread Male Optional)**

#### Type 3 Female
- **(Optional)**

#### Type 6 Solid
- **(Full Thread Male Optional)**

<table>
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<th>7” Bore (177.80)</th>
<th>8” Bore (203.20)</th>
<th>10” Bore (254.00)</th>
<th>12” Bore (304.80)</th>
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<td>2 1/32” (5.10)</td>
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<td>1 1/16” (1.50)</td>
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### Series A & EA, NFPA Aluminum Air Cylinders with 01 (MS4) Side Tapped

### Series J & EJ, NFPA Steel Air Cylinders with 01 (MS4) Side Tapped

All Dimensions in Inches (mm)
Series A & EA, NFPA Aluminum Air Cylinders (ø1-1/2 to 6")
Series J & EJ, NFPA Steel Air Cylinders (ø1-1/2 to 6”)

- **NFPA (MF1) 03 Head Rectangular Flange Mount** for 1-1/2" to 6" bore sizes.
- **Series A & J Cylinders rated to 250 PSI air,**
  **400 PSI hydraulic (non-shock).**
- **Series EA & EJ Cylinders rated to 250 PSI air only.**
- **Designed for non-lube service.**
- **Switches available on all bore sizes.**
  (See pages ACT-1-90 & 91 for ordering information.)

### Cylinder with 03 (MF1) Head Rectangular Flange

**Cylinder Order Information**

<table>
<thead>
<tr>
<th>03</th>
<th>-</th>
<th>-</th>
<th>-</th>
<th>-</th>
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</thead>
</table>

### Mounting Options
- 01 Side Tapped (MS4)
- 03 Head Rectangular Flange (MF1)
- 03 Head Square (ME3) – 7” to 12” Bores
- 04 Cap Rectangular Range (MP2)
- 04 Cap Square (ME5) – 7” to 12” Bores
- 05 Basic Cylinder No Mounting (MX0)
- 06 Both Ends (4) Tie Rods Ext. (MX1)
- 08 Both Ends (2) Tie Rods Ext. (MX4)
- 06C Cap Tie Rods Ext. (MX2)
- 06R Head Tie Rods Ext. (MX3)
- 07 Removable Head Trunnion (MT1) – A & EA
- 07 Head Trunnion (MT1) – J & EJ
- 08 Cap Trunnion (MT2) – A & EA
- 08 Cap Trunnion (MT2) – J & EJ
- 09 Side Lugs (MS2)
- 10 Center Trunnion (MT4)
- 11 Side End Angles (MS1)
- 12 Cap Fixed Clevis (MP1)
- 15 Side End Lugs (MS7)
- 16 Sleeve Nut Construction (Universal)
- 20 Head Square Range (MF5)
- 21 Cap Square Range (MF6)
- 22 Detachable Cap Clevis (MP2)
- 32 Cap Fixed Eye (MP3)
- 42 Detachable Cap Eye (MP4)
- 52 Spherical Bearing
- 60 Base Bar (Not NFPA – A & EA Only)

### Cushion in Head
- 3 None
- 5 Non-Adjustable Cushion
- 7 Adjustable Cushion (Position 2)
- 9 Decel Cushion
  *(Standard with EA & EJ)*

### Cushion in Cap
- 3 None
- 5 Non-Adjustable Cushion
- 7 Adjustable Cushion (Position 2)
- 9 Decel Cushion
  *(Standard with EA & EJ)*

See page ACT-1-96 for complete instructions on how to order cylinders.

### Additional Options – order alphabetically – More on page ACT-1-85

- **HR** Case Hardened (45 Rc)
- **L(...)** Port Location position 1 standard: L (Head Cap)
  *(specify position 1 thru 4 for head and/or cap)*
- **MS** Metal Rod Scraper
- **N(...)** Cushion Adjust Screw Location position 2 standard: N (Head Cap)
  *(specify position 1 thru 4 for head and/or cap)*
- **P(...)** Non-Standard Port Sizes: *(specify port size for P(...) head only, P(...) cap only, or P(...) both head and cap)*
- **PS** Magnetic Piston – includes aluminum tube option for J & EJ - Std. for Alum
- **RS** Rod Stud
  - Type 1 (5/8" – 1 1/4" @Rod)
  - Type 2 (5/8" & 1" @Rod)
- **RX** Rod Extensions: *(specify length of additional rod extension)*
- **SS** 303 Stainless Steel (Hard Chrome Plated)
- **ST(...)** Stop Tube: *(specify stop tube length)*
  - Cap End (EH) – See page ACT-1-86
  - Rod End (ER) – See page ACT-1-86
- **ST(...)** Stop Tube: *(specify stop tube length)*
  - Cap End (EH) – See page ACT-1-86
  - Rod End (ER) – See page ACT-1-86
- **T** Special Rod Threads: *(specify rod thread)*
- **TX** Thread Extensions: *(specify length of thread extension)*
- **V** Viton® Seals

### Piston Rod Threads Type
- 1 Small Male (Solid)
- 2 Intermediate Thread Male (Solid)
- 3 Female
- 6 Full Thread Male (Solid)
- 7 Plain Rod End

### Piston Rod Diameters
- **A** 5/8" Standard on 1 1/2", 2", 2 1/2"
- **B** 1" Standard on 3 1/4", 4", 5"
- **C** 1 1/4" Standard on 6", 7", 8"
- **D** 1 1/2" Standard on 10" Over-sized on 6", 7", 8"
- **E** 2" Standard on 12" Over-sized on 10"
- **F** 2 1/2" Over-sized on 10", 12"

**† Standard with EA & EJ**

**See page ACT-1-96 for complete instructions on how to order cylinders.**
### Standard & Optional Rod Ends

**Type 1 Solid**  
(Stud Male Optional)

**Type 1 Studded**  
(Stud Male Optional)

**Type 2 Studded**  
(Intermediate Thread Male Optional)

**Type 2 Solid**  
(Intermediate Thread Male Optional)

**Type 3 Female**  
(Optional)

**Type 6 Solid**  
(Full Thread Male Optional)

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<tr>
<th>Dimension</th>
<th>1\frac{1}{2}” Bore (38.10)</th>
<th>2” Bore (50.80)</th>
<th>2\frac{1}{4}” Bore (63.50)</th>
<th>3\frac{1}{4}” Bore (82.55)</th>
<th>4” Bore (101.60)</th>
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<th>6” Bore (152.40)</th>
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**All Dimensions in Inches (mm)**
Series A & EA, NFPA Aluminum Air Cylinders (ø7” & 8”)
Series J & EJ, NFPA Steel Air Cylinders (ø7” to 12”)

- NFPA (ME3) 03 Head Square Mount and NFPA (ME4) 04 Cap Square Mount for 7” to 12” bore sizes only.
- Series A & J Cylinders rated to 250 PSI air, 400 PSI hydraulic (non-shock).
  Series EA & EJ Cylinders rated to 250 PSI air only.
- Designed for non-lube service.
- Switches available on all bore sizes.
  (See pages ACT-1-90 & 91 for ordering information.)

Cylinder Order Information

- **03** - Head Mounting Options
- **04** - Cap Mounting Options

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<tr>
<td>EJ</td>
<td>Series EJ Cylinder</td>
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**Mounting Options**
- 01 Side Tapped (MS4)
- 03 Head Rectangular Flange (MF1)
- 03 Head Square (ME3) - 7” to 12” Bores
- 04 Cap Rectangular Flange (MF2)
- 04 Cap Square (ME4) - 7” to 12” Bores
- 05 Basic Cylinder No Mounting (MX0)
- 06 Both Ends (4) Tie Rods Ext. (MX1)
- 68 Both Ends (2) Tie Rods Ext. (MX4)
- 6C Cap Tie Rods Ext. (MX2)
- 6R Head Tie Rods Ext. (MX3)
- 7R Removable Head Trunnion (MT1) - A & EA
- 07 Head Trunnion (MT1) - J & EJ
- 08 Cap Trunnion (MT2) - A & EA
- 09 Cap Trunnion (MT2) - J & EJ
- 10 Center Trunnion (MT4)
- 11 Side End Angles (MS1)
- 12 Cap Fixed Clevis (MP1)
- 15 Side End Lugs (MIS1)
- 16 Sleeve Nut Construction (Universal)
- 20 Head Square Range (MP5)
- 21 Cap Square Range (MR5)
- 22 Detachable Cap Clevis (MP2)
- 32 Cap Fixed Eye (MP3)
- 42 Detachable Cap Eye (MP4)
- 52 Spherical Bearing
- 60 Base Bar (Not NFPA - A & EA Only)

**Additional Options – order alphabetically – More on page ACT-1-95**

- **HR** (Case Hardened (45 Rc))
- **H** Head Location position 1 (standard: L-Head Cap)
- **N** (Cushion Adjust Screw Location position 2: N-Head Cap)
- **P** (Non-Standard Port Sizes: specify port size for P-Head only; P-L_EJ only)
- **PS** (Magnetic Piston – includes aluminum tube option for J & EJ - Std. for Alum)
- **RS** (Rod Stud)
  - Type 1 (5/8” – 1 3/4” øRod)
  - Type 2 (5/8” & 1” øRod)
- **ST** (Stop Tube (Cap End))
- **SR** (Stop Tube (Rod End))
- **T** (Special Rod Threads) (specify rod thread)
- **TX** (Thread Extensions) (specify length of thread extension)
- **V** (Viton® Seals)

**Mounting Options**
- **01** Side Tapped (MS4)
- **03** Head Rectangular Flange (MF1)
- **04** Cap Rectangular Flange (MF2)
- **05** Basic Cylinder No Mounting (MX0)
- **06** Both Ends (4) Tie Rods Ext. (MX1)
- **07** Head Trunnion (MT1) - A & EA
- **08** Cap Trunnion (MT2) - A & EA
- **09** Cap Trunnion (MT2) - J & EJ
- **10** Center Trunnion (MT4)
- **11** Side End Angles (MS1)
- **12** Cap Fixed Clevis (MP1)
- **15** Side End Lugs (MIS1)
- **16** Sleeve Nut Construction (Universal)
- **20** Head Square Range (MP5)
- **21** Cap Square Range (MR5)
- **22** Detachable Cap Clevis (MP2)
- **32** Cap Fixed Eye (MP3)
- **42** Detachable Cap Eye (MP4)
- **52** Spherical Bearing
- **60** Base Bar (Not NFPA - A & EA Only)

**Cushion in Head**
- **3** None
- **5** Non-Adjustable Cushion
- **7** Adjustable Cushion (Position 2)
- **9** Decel Cushion
- **11** None
- **13** Non-Adjustable Cushion
- **17** Adjustable Cushion (Position 2)
- **19** Decel Cushion

**Cushion in Cap**
- **3** None
- **5** Non-Adjustable Cushion
- **7** Adjustable Cushion (Position 2)
- **9** Decel Cushion

**Piston Rod Threads Type**
- **1** Small Male (Solid)
- **2** Intermediate Male (Solid)
- **3** Female
- **6** Full Thread Male (Solid)
- **7** Plain Rod End

**Piston Rod Diameter**
- **A** 3/8” Standard: 3/8” x 1/4”, 3/8” x 5/8”
- **B** 1” Standard: 1” x 1/4”, 1” x 5/8”
- **C** 1 1/4” Standard: 1 1/4” x 1/4”, 1 1/4” x 5/8”
- **D** 1 1/2” Standard: 1 1/2” x 1/4”, 1 1/2” x 5/8”
- **E** 2” Standard: 2” x 1/4”, 2” x 5/8”
- **F** 2 1/2” Standard: 2 1/2” x 1/4”, 2 1/2” x 5/8”

**Port and Cushion Adjustment Positions (As viewed from rod end):**
- Port standard position 1, Cushion Adjustment standard position 2)
- NOTE: A Port and a Cushion Adjustment cannot be in the same position.
### 03 (ME3)

#### Standard & Optional Rod Ends

<table>
<thead>
<tr>
<th>Type</th>
<th>Description</th>
<th>Bore Sizes (Small Male)</th>
<th>Bore Sizes (Studded Male)</th>
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<tbody>
<tr>
<td>Type 1 Solid</td>
<td>(Small Male)</td>
<td>7/8&quot; (17.78)</td>
<td>1-1/4&quot; (31.75)</td>
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<tr>
<td>Type 1 Studded</td>
<td>(Studded Male Optional)</td>
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<td>1-1/4&quot; (31.75)</td>
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<td>(Intermediate Thread Male Optional)</td>
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<td>Type 3 Female</td>
<td>(Optional)</td>
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<tr>
<td>Type 6 Solid</td>
<td>(Full Thread Male Optional)</td>
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### 04 (ME4)

#### Standard & Optional Rod Ends

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<td>1-1/2&quot; (38.10)</td>
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<tr>
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<td>(Full Thread Male Optional)</td>
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### Dimensions

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<td>FF Thds.</td>
<td>1 1/4&quot; (31.75)</td>
<td>1 1/2&quot; (38.10)</td>
<td>1 3/4&quot; (44.45)</td>
<td>2&quot; (50.80)</td>
</tr>
</tbody>
</table>

### Additional Information

- All Dimensions in Inches (mm)
- Brookville, OH USA, Phone 937-833-4033, www.norgren.com

---

### Series A & EA Cylinder with 03 (ME3) Head Square & 04 (ME4) Cap Square

- Series J & EJ NFPA Cylinder with 03 (ME3) Head Square & 04 (ME4) Cap Square

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ACT-1-25
Series A & EA, NFPA Aluminum Air Cylinders (\(\varnothing 1-1/2\) to 6")
Series J & EJ, NFPA Steel Air Cylinders (\(\varnothing 1-1/2\) to 6")

- **NFPA (MF2)** 04 Cap Rectangular Flange Mount for 1-1/2" to 6" bore sizes.
- **Series A & J** Cylinders rated to 250 PSI air, 400 PSI hydraulic (non-shock).
  - Series EA & EJ Cylinders rated to 250 PSI air only.
- Designed for non-lube service.
- Switches available on all bore sizes.
  - (See pages ACT-1-90 & 91 for ordering information.)

**Cylinder with 04 (MF2) Cap Rectangular Flange**

**Cylinder Order Information**

| Bore and Stroke (write out) | 04 - - - - |

**Mounting Options**

- 01 Side Tapped (MS4)
- 03 Head Rectangular Range (MF1)
- 03 Head Square (ME3) - 7" to 12" Bores
- 04 Cap Rectangular Flange (MF2)
- 04 Cap Square (ME5) - 1-1/8" to 12" Bores
- 05 Basic Cylinder No Mounting (MX0)
- 06 Both Ends (4) Tie Rods Ext. (MX1)
- 07 Both Ends (5) Tie Rods Ext. (MX4)
- 06 Cap Tie Rods Ext. (MX2)
- 06R Head Tie Rods Ext. (M00)
- 07 Removable Head Trunnion (MT1) - A & EA
- 07 Head Trunnion (MT1) - J & EJ
- 08 Cap Trunnion (MT2) - A & EA
- 08 Cap Trunnion (MT2) - J & EJ
- 09 Side Lugs (MS5)
- 10 Center Trunnion (MT4)
- 11 Side End Angles (MS1)
- 12 Cap Fixed Ovals (MP1)
- 15 Side End Lugs (MS7)
- 16 Sleeve Nut Construction (Universal)
- 20 Head Square Range (MF5)
- 21 Cap Square Range (MR8)
- 22 Detachable Cap Ovals (MP2)
- 22 Detachable Cap Eye (MP4)
- 52 Spherical Bearing
- 60 Base Bar (Not NFPA - A & EA Only)

**Cushion in Head**

- 3 None
- 5† Non-Adjustable Cushion
- 7 Adjustable Cushion (Position 2)
- 9 Decel Cushion

**Cushion in Cap**

- 3 None
- 5† Non-Adjustable Cushion
- 7 Adjustable Cushion (Position 2)
- 9 Decel Cushion

*†Standard with EA & EJ

See page ACT-1-96 for complete instructions on how to order cylinders.
Series A & EA, NFPA Aluminum Air Cylinders (ø1-1/2 to 8")
Series J & EJ, NFPA Steel Air Cylinders (ø1-1/2 to 12")

- NFPA (MX0) 05 Basic Mount, for 1-1/2" to 6" bore sizes.
- Series A & J Cylinders rated to 250 PSI air, 400 PSI hydraulic (non-shock).
  Series EA & EJ Cylinders rated to 250 PSI air only.
- Designed for non-lube service.
- Switches available on all bore sizes. (See pages ACT-1-90 & 91 for ordering information.)

Cylinder with 05 (MX0) Basic

Cylinder Order Information

<table>
<thead>
<tr>
<th>05</th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
</table>

Mounting Options
- 01 Side Tapped (MS4)
- 03 Head Rectangular Range (MF1)
- 03 Head Square (ME3) – 7" to 12" Bores
- 04 Cap Square Range (MP2)
- 05 Basic Cylinder No Mounting (MX0)
- 06 Both Ends (4) Tie Rods Est. (MX1)
- 08 Both Ends (2) Tie Rods Est. (MX4)
- 06 Cap Tie Rods Est. (MX5)
- 06R Head Tie Rods Est. (MX6)
- 07 Removable Head Trunion (MT1) – A & EA
- 07 Head Trunion (MT1) – J & EJ
- 08 Cap Trunion (MT2) – A & EA
- 08 Cap Trunion (MT2) – J & EJ
- 09 Side Lugs (MS2)
- 10 Center Trunion (MT4)
- 11 Side End Angles (MS1)
- 12 Cap Fixed Clevis (MP1)
- 15 Side End Lugs (MS7)
- 16 Sleeve Nut Construction (Universal)
- 20 Head Square Range (MF5)
- 21 Cap Square Range (MP6)
- 22 Detachable Cap Clevis (MP2)
- 32 Cap Fixed Eye (MP3)
- 42 Detachable Cap Eye (MP4)
- 52 Spherical Bearing
- 60 Base Bar (Not NFPA - A & EA Only)

Cushion in Head
- 3 None
- 5" Non-Adjustable Cushion
- 7 Adjustable Cushion (Position 2)
- 9 Decal Cushion

*Cushion in Cap
- 3 None
- 5" Non-Adjustable Cushion
- 7 Adjustable Cushion (Position 2)
- 9 Decal Cushion

See page ACT-1-96 for complete instructions on how to order cylinders.
# Standard & Optional Rod Ends

## Type 1 Solid (Small Male)

<table>
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<tr>
<th>Dimension</th>
<th>1 1/2&quot; Bore (38.10)</th>
<th>2&quot; Bore (50.80)</th>
<th>2 1/2&quot; Bore (63.50)</th>
<th>3 1/4&quot; Bore (82.55)</th>
<th>4&quot; Bore (101.60)</th>
<th>5&quot; Bore (127.00)</th>
<th>6&quot; Bore (152.40)</th>
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<tr>
<td>a Rod</td>
<td>Std. 5/8&quot; (15.88)</td>
<td>5/8&quot; (15.88)</td>
<td>5/8&quot; (15.88)</td>
<td>1&quot; (25.40)</td>
<td>1&quot; (25.40)</td>
<td>1&quot; (25.40)</td>
<td>1 1/2&quot; (34.93)</td>
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<td>O.S. 1&quot; (25.40)</td>
<td>1&quot; (25.40)</td>
<td>1&quot; (25.40)</td>
<td>1 1/2&quot; (34.93)</td>
<td>1 1/2&quot; (34.93)</td>
<td>1 1/2&quot; (34.93)</td>
<td>1 1/2&quot; (44.45)</td>
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## Type 1 Studded (Studded Male Optional)

### Type 2 Studded (Intermediate Thread Male Optional)

<table>
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<tr>
<th>Dimension</th>
<th>1 1/2&quot; Bore (38.10)</th>
<th>2&quot; Bore (50.80)</th>
<th>2 1/2&quot; Bore (63.50)</th>
<th>3 1/4&quot; Bore (82.55)</th>
<th>4&quot; Bore (101.60)</th>
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<tr>
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<td>5/8&quot; (15.88)</td>
<td>5/8&quot; (15.88)</td>
<td>1&quot; (25.40)</td>
<td>1&quot; (25.40)</td>
<td>1&quot; (25.40)</td>
<td>1 1/2&quot; (34.93)</td>
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<td>O.S. 1&quot; (25.40)</td>
<td>1&quot; (25.40)</td>
<td>1&quot; (25.40)</td>
<td>1 1/2&quot; (34.93)</td>
<td>1 1/2&quot; (34.93)</td>
<td>1 1/2&quot; (34.93)</td>
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## Type 2 Solid (Intermediate Thread Male Optional)

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<th>3 1/4&quot; Bore (82.55)</th>
<th>4&quot; Bore (101.60)</th>
<th>5&quot; Bore (127.00)</th>
<th>6&quot; Bore (152.40)</th>
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<td>5/8&quot; (15.88)</td>
<td>5/8&quot; (15.88)</td>
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<td>1&quot; (25.40)</td>
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<td>1 1/2&quot; (34.93)</td>
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<tr>
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<td>O.S. 1&quot; (25.40)</td>
<td>1&quot; (25.40)</td>
<td>1&quot; (25.40)</td>
<td>1 1/2&quot; (34.93)</td>
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## Type 3 Female (Optional)

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<th>2 1/2&quot; Bore (63.50)</th>
<th>3 1/4&quot; Bore (82.55)</th>
<th>4&quot; Bore (101.60)</th>
<th>5&quot; Bore (127.00)</th>
<th>6&quot; Bore (152.40)</th>
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<tbody>
<tr>
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<td>Std. 5/8&quot; (15.88)</td>
<td>5/8&quot; (15.88)</td>
<td>5/8&quot; (15.88)</td>
<td>1&quot; (25.40)</td>
<td>1&quot; (25.40)</td>
<td>1&quot; (25.40)</td>
<td>1 1/2&quot; (34.93)</td>
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<td>O.S. 1&quot; (25.40)</td>
<td>1&quot; (25.40)</td>
<td>1&quot; (25.40)</td>
<td>1 1/2&quot; (34.93)</td>
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<td>1 1/2&quot; (34.93)</td>
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</table>

## Type 4 Solid (Full Thread Male Optional)

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<th>Dimension</th>
<th>1 1/2&quot; Bore (38.10)</th>
<th>2&quot; Bore (50.80)</th>
<th>2 1/2&quot; Bore (63.50)</th>
<th>3 1/4&quot; Bore (82.55)</th>
<th>4&quot; Bore (101.60)</th>
<th>5&quot; Bore (127.00)</th>
<th>6&quot; Bore (152.40)</th>
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<tbody>
<tr>
<td>a Rod</td>
<td>Std. 5/8&quot; (15.88)</td>
<td>5/8&quot; (15.88)</td>
<td>5/8&quot; (15.88)</td>
<td>1&quot; (25.40)</td>
<td>1&quot; (25.40)</td>
<td>1&quot; (25.40)</td>
<td>1 1/2&quot; (34.93)</td>
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<td>O.S. 1&quot; (25.40)</td>
<td>1&quot; (25.40)</td>
<td>1&quot; (25.40)</td>
<td>1 1/2&quot; (34.93)</td>
<td>1 1/2&quot; (34.93)</td>
<td>1 1/2&quot; (34.93)</td>
<td>1 1/2&quot; (44.45)</td>
</tr>
</tbody>
</table>

### Dimensions

- **All Dimensions in Inches (mm)**
- **A**
- **B**
- **C**
- **D**
- **E**
- **F**
- **G**
- **J**
- **K**
- **L**
- **MM**
- **P**
- **R**
- **VF**
- **WF**
- **Y**
- **ZB**

### Series A & EA, NFPA Aluminum Air Cylinder with 05 (MX0) Basic

<table>
<thead>
<tr>
<th>Series</th>
<th>Across Flats</th>
</tr>
</thead>
<tbody>
<tr>
<td>A</td>
<td>3.625</td>
</tr>
<tr>
<td>B</td>
<td>4.875</td>
</tr>
<tr>
<td>C</td>
<td>6.250</td>
</tr>
</tbody>
</table>

### Series J & EJ, NFPA Steel Air Cylinder with 05 (MX0) Basic

<table>
<thead>
<tr>
<th>Series</th>
<th>Across Flats</th>
</tr>
</thead>
<tbody>
<tr>
<td>A</td>
<td>3.625</td>
</tr>
<tr>
<td>B</td>
<td>4.875</td>
</tr>
<tr>
<td>C</td>
<td>6.250</td>
</tr>
</tbody>
</table>

**Notes**

- Standard & Optional Rod Ends
- Across Flats
- A, B, C
- EE NPT (2)
- O.S.
- Thds.
- Ø
- All Dimensions in Inches (mm)

---

**Dimensions for Various Series**

- **Series A & EA**
- **Series J & EJ**
Series A & EA, NFPA Aluminum Air Cylinders (ø1-1/2 to 8"
Series J & EJ, NFPA Steel Air Cylinders (ø1-1/2 to 12"

- **NFPA (MX0)** 05 Basic Mount, for 7" to 12" bore sizes.
- **Series A & J** Cylinders rated to 250 PSI air, 400 PSI hydraulic (non-shock).
  Series EA & EJ Cylinders rated to 250 PSI air only.
- **Designed for non-lube service.**
- **Switches available on all bore sizes.** *(See pages ACT-1-90 & 91 for ordering information.)*

---

**Cylinder Order Information**

**05**  
---

### Cylinder Order Information

<table>
<thead>
<tr>
<th>Mounting Options</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>01</td>
<td>Side Tapped (MS4)</td>
</tr>
<tr>
<td>02</td>
<td>Head Rectangular Range (MF1)</td>
</tr>
<tr>
<td>03</td>
<td>Head Square Range (MF3)</td>
</tr>
<tr>
<td>04</td>
<td>Cap Rectangular Range (MF2)</td>
</tr>
<tr>
<td>05</td>
<td>Cap Square (MS6)</td>
</tr>
<tr>
<td>06</td>
<td>Basic Cylinder w/ Mounting (MX0)</td>
</tr>
<tr>
<td>07</td>
<td>Both Ends (4) Tie Rod Ext. (MX1)</td>
</tr>
<tr>
<td>08</td>
<td>Cap Tie Rod Ext. (MX2)</td>
</tr>
<tr>
<td>09</td>
<td>Head Tie Rod Ext. (MX3)</td>
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<tr>
<td>10</td>
<td>Removable Head Trunnion (MT1) - A &amp; EA</td>
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<tr>
<td>11</td>
<td>Head Trunnion (MT1) - J &amp; EJ</td>
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<tr>
<td>12</td>
<td>Cap Trunnion (MT2) - A &amp; EA</td>
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<tr>
<td>13</td>
<td>Cap Trunnion (MT2) - J &amp; EJ</td>
</tr>
<tr>
<td>14</td>
<td>Side Lugs (MS7)</td>
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<td>15</td>
<td>Center Trunnion (MT4)</td>
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<td>16</td>
<td>Sleeve Nut Construction (Universal)</td>
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<td>Head Square Range (MF5)</td>
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<td>21</td>
<td>Cap Square Range (MF8)</td>
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<td>Cap Fixed Gexis (MP3)</td>
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<td>24</td>
<td>Detachable Cap Eye (MP4)</td>
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<td>25</td>
<td>Spherical Bearing</td>
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<tr>
<td>60</td>
<td>Base Bar (Not NFPA - A &amp; EA Only)</td>
</tr>
</tbody>
</table>

**Piston Rod Threads Type**

1. Small Male (Solid)
2. Intermediate Thread Male (Solid)
3. Female
4. Full Thread Male (Solid)
5. Plain Rod End

**Piston Rod Extractors**

- **A**
- **B**
- **C**
- **D**
- **E**
- **F**

**Cushion in Head**

- 3. None
- 5. Non-Adjustable Cushion
- 7. Adjustable Cushion (Position 2)
- 9. Decel Cushion

**Cushion in Cap**

- 3. None
- 5. Non-Adjustable Cushion
- 7. Adjustable Cushion (Position 2)
- 9. Decel Cushion

See page ACT-1-96 for complete instructions on how to order cylinders.
### Series A & EA, NFPA Aluminum Air Cylinders with 05 (MX0) Basic
### Series J & EJ, NFPA Steel Air Cylinders with 05 (MX0) Basic

All Dimensions in Inches (mm)

### Dimensions Table

<table>
<thead>
<tr>
<th>Dimension</th>
<th>7&quot; Bore (177.80)</th>
<th>8&quot; Bore (203.20)</th>
<th>10&quot; Bore (254.00)</th>
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<tr>
<td>ø Rod</td>
<td>Std. 1 3/8&quot; (34.93)</td>
<td>Std. 1 3/8&quot; (34.93)</td>
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<td>O.S. 2.000 (50.80)</td>
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Series A & EA, NFPA Aluminum Air Cylinders (ø1-1/2 to 8")  
Series J & EJ, NFPA Steel Air Cylinders (ø1-1/2 to 12")

**Cylinder with 06 (MX1) Both Ends (4) Tie Rods Extended Shown**

- **NFPA (MX1) 06 (4) Extended Tie Rods Both Ends Mount**  
  NFPA (MX2) 6C Cap Tie Rods Extended Mount  
  NFPA (MX3) 6R Head Tie Rods Extended Mount  
  NFPA (MX4) 6B (2) Extended Tie Rods Both Ends Mount  
  for 1-1/2" to 6" bore sizes.

- **Series A & J Cylinders rated to 250 PSI air, 400 PSI hydraulic (non-shock).**  
  Series EA & EJ Cylinders rated to 250 PSI air only.

- **Designed for non-lube service.**

- **Switches available on all bore sizes.**  
  (See pages ACT-1-90 & 91 for ordering information.)

### Cylinder Order Information

<table>
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<th>Bore and Stroke (write out)</th>
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#### Mounting Options
- 01 Side Tapped (MS4)
- 03 Head Rectangular Range (MF1)
- 03 Head Square (MS3) - 7" to 12" Bores
- 04 Cap Rectangular Range (MP2)
- 04 Cap Square (MS4) - 7" to 12" Bores
- 05 Basic Cylinder No Mounting (MX0)
- 06 Both Ends (4) Tie Rods Ext. (MX1)
- 6B Both Ends (2) Tie Rods Ext. (MX4)
- 6C Cap Tie Rods Ext. (MX2)
- 6R Head Tie Rods Ext. (MX3)
- 7R Removable Head Trunion (MT1) - A & EA
- 07 Head Trunion (MT1) - J & EJ
- 8R Cap Trunion (MT2) - A & EA
- 08 Cap Trunion (MT2) - J & EJ
- 09 Side Lugs (MS9)
- 10 Center Trunion (MT4)
- 11 Side End Angles (MS1)
- 12 Cap Fixed Oviss (MP1)
- 15 Side End Lugs (MS3)
- 16 Sleeve Nut Construction (Universal)
- 20 Head Square Range (MP5)
- 21 Cap Square Range (MP6)
- 22 Detachable Cap Oviss (MP8)
- 32 Cap Fixed Eye (MP3)
- 42 Detachable Cap Eye (MP4)
- 52 Spherical Bearing
- 60 Base Bar (Not NFPA - A & EA Only)

#### Cushion in Head
- 03 None
- 1 Non-Adjustable Cushion
- 7 Adjustable Cushion (Position 2)
- 9 Decel Cushion
  - Standard with EA & EJ

#### Cushion in Cap
- 03 None
- 1 Non-Adjustable Cushion
- 7 Adjustable Cushion (Position 2)
- 9 Decel Cushion
  - Standard with EA & EJ

See page ACT-1-96 for complete instructions on how to order cylinders.

#### Additional Options – order alphabetically – More on page ACT-1-95

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<td>Class Hardened (45 Rc)</td>
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<td>L(.....)</td>
<td>Port Location position 1 standard: L(Head Cap) (specify position 1 thru 4 for head and/or cap)</td>
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<td>MS</td>
<td>Metal Rod Scraper</td>
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<td>N(.....)</td>
<td>Cushion Adjust Screw Location position 2 standard: N(Head Cap) (specify position 1 thru 4 for head and/or cap)</td>
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<td>Non-Standard Port Sizes: (specify port size for P_(H) head only, P_(C) cap only, or P_(H,C) both head &amp; cap)</td>
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<td>PS</td>
<td>Magnetic Piston – includes aluminum tube option for J &amp; EJ - Std for Alum</td>
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<td>RS</td>
<td>Rod Stud Type 1 (5/8&quot; – 1 3/4&quot; øRod) Type 2 (5/8&quot; &amp; 1&quot; øRod)</td>
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<td>RX</td>
<td>Rod Extensions (specify length of additional rod extension)</td>
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<td>SC</td>
<td>Single Acting Spring Extend (Cap End) – See page ACT-1-86</td>
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<td>SF</td>
<td>Single Acting Spring Retract (Rod End) – See page ACT-1-86</td>
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<td>SS</td>
<td>303 Stainless Steel (Hard Chrome Plated)</td>
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<td>ST(C)</td>
<td>Stop Tube (Cap End) (specify stop tube length)</td>
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<td>ST(R)</td>
<td>Stop Tube (Rod End) (specify stop tube length)</td>
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<td>Special Rod Threads (specify rod thread)</td>
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<td>Thread Extensions (specify length of thread extension)</td>
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<td>V</td>
<td>Viton® Seals</td>
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#### Piston Rod Threads Type
- 1 Small Male (Solid)
- 2 Intermediate Thread Male (Solid)
- 3 Female
- 4 Full Thread Male (Solid)
- 7 Plain Rod End

#### Piston Rod Diavers
- A Standard on 1 1/2", 2", 2 1/2"
- B Standard on 3 1/4", 4", 5"  
  Oversized on 1 1/2", 2", 2 1/2"
- C Standard on 5", 7", 8"  
  Oversized on 3 1/4", 4", 5"
- D Standard on 10"  
  Oversized on 6", 7", 8"
- E 2" Oversized on 10"
- F 2 1/2" Oversized on 10", 12"** A & EA uses A-D only.

#### Port and Cushion Adjustment Positions (As viewed from rod end: Port standard position 1, Cushion Adjustment standard position 2.)  
NOTE: A Port and a Cushion Adjustment cannot be in the same position.

---

*1 1/2", 2", 2 1/2" bore cylinders have 3/8" NPT Standard, 1/2" NPT oversize.  
3 1/4", 4", 5" bore cylinders have 1/2" NPT Standard, 3/4" NPT oversize.  
This will add 1/8" to the overall cylinder length.*
### Standard & Optional Rod Ends

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<tr>
<th>Type</th>
<th>Description</th>
<th>Dimensions</th>
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<td><strong>Type 1 Solid</strong></td>
<td>(Small Male)</td>
<td>D = 1 1/2&quot; Bore (38.10)</td>
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<td><strong>Type 6 Solid</strong></td>
<td>(Full Thread Male Optional)</td>
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| Series A & EA, NFPA Aluminum Air Cylinders Combinations with Extended Tie Rods | Series J & EJ, NFPA Steel Air Cylinders Combinations with Extended Tie Rods | All Dimensions in Inches (mm) |
Series A & EA, NFPA Aluminum Air Cylinders (ø1-1/2 to 8")
Series J & EJ, NFPA Steel Air Cylinders (ø1-1/2 to 12")

- **NFPA (MX1) 06 (4) Extended Tie Rods Both Ends Mount**
- **NFPA (MX2) 6C Cap Tie Rods Extended Mount**
- **NFPA (MX3) 6R Head Tie Rods Extended Mount**
- **NFPA (MX4) 6B (2) Extended Tie Rods Both Ends Mount**
  for 7" to 12" bore sizes.

- **Series A & J Cylinders rated to 250 PSI air,**
  400 PSI hydraulic (non-shock).
- **Series EA & EJ Cylinders rated to 250 PSI air only.**
- **Designed for non-lube service.**
- **Switches available on all bore sizes.**
  (See pages ACT-1-90 & 91 for ordering information.)

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**Cylinder Order Information**

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**Mounting Options**

- 01 Side Tapped (MS4)
- 03 Head Rectangular (MF1)
- 03 Head Square (MS5) – 7" to 12" Bore
- 04 Cap Rectangular (MF2)
- 04 Cap Square (MS6) – 7" to 12" Bore
- 05 Basic Cylinder No Mounting (MX0)
- 06 Both Ends (4) Tie Rods Ext. (MX1)
- 08 Both Ends (2) Tie Rods Ext. (MX4)
- 6C Cap Tie Rods Ext. (MX2)
- 6R Head Tie Rods Ext. (MX3)
- 07 Removable Head Trunion (MT1) - A & EA
- 07 Cap Trunin (MT2) - A & EA
- 08 Cap Trunin (MT2) - J & EJ
- 09 Side Lugs (MS2)
- 10 Center Trunion (MT4)
- 11 Side End Angles (MS1)
- 12 Cap Fixed Clevis (MP1)
- 15 Side End Lugs (MS3)
- 16 Sleeve Nut Construction (Universal)
- 20 Head Square Range (MF9)
- 21 Cap Square Range (MF9)
- 22 Detachable Cap Clevis (MP2)
- 32 Cap Fixed Eye (MP3)
- 42 Detachable Cap Eye (MP4)
- 52 Spherical Bearing
- 60 Base Bar (Not NFPA - A & EA Only)

**Cushion in Head**

- 3 None
- 5 Non-Adjustable Cushion
- 7 Adjustable Cushion (Position 2)
- 9 Decal Cushion
  
  *Standard with WA & EA

**Cushion in Cap**

- 3 None
- 5 Non-Adjustable Cushion
- 7 Adjustable Cushion (Position 2)
- 9 Decal Cushion
  
  *Standard with WA & EA

See page ACT-1-96 for complete instructions on how to order cylinders.
Series A & EA, NFPA Aluminum Air Cylinder Combinations with Extended Tie Rods
Series J & EJ, NFPA Steel Air Cylinder Combinations with Extended Tie Rods

All Dimensions in Inches (mm)

<table>
<thead>
<tr>
<th>Dimension</th>
<th>7&quot; Bore (177.80)</th>
<th>8&quot; Bore (203.20)</th>
<th>10&quot; Bore (254.00)</th>
<th>12&quot; Bore (304.80)</th>
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Type 1 Solid
Type 2 Studded
Type 2 Solid
Type 3 Female
Type 6 Solid

Standard & Optional Rod Ends

[Diagram showing standard and optional rod ends]

[Table showing dimensions and tolerances]
Series A & EA, NFPA Aluminum Air Cylinders (ø1-1/2 to 8")
Series J & EJ, NFPA Steel Air Cylinders (ø1-1/2 to 12")

- **NFPA (MT1) 07 Head Trunnion Mount for 1-1/2" to 6" bore sizes.**
- **Series A & J Cylinders rated to 250 PSI air, 400 PSI hydraulic (non-shock).**
- **Series EA & EJ Cylinders rated to 250 PSI air only.**
- **Designed for non-lube service.**
- **Switches available on all bore sizes.** (See page ACT-1-90 & 91 for ordering information.)
- **Head Trunnions are removable.**

**Cylinder with 07 (MT1) Head Trunnion**

**Cylinder Order Information**

<table>
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<th>-</th>
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**Mounting Options**
- 01 Side Tapped (MS4)
- 03 Head Rectangular Range (MF1)
- 03 Head Square (MS3) – 7" to 12" Bores
- 04 Cap Rectangular Range (MF2)
- 04 Cap Square (MS4) – 7" to 12" Bores
- 05 Basic Cylinder No Mounting (MX0)
- 06 Both Ends (4) Tie Rods Ext. (MX1)
- 06B Both Ends (2) Tie Rods Ext. (MX4)
- 06C Cap Tie Rods Ext. (M02)
- 06R Head Tie Rods Ext. (MX5)

**7R Removable Head Trunnion (MT1) - A & EA**

**7R Head Trunnion (MT1) - J & EJ**

**8R Cap Trunnion (MT2) - A & EA**

**8R Cap Trunnion (MT2) - J & EJ**

**9 Side Lugs (MS2)**

**10 Center Trunnion (MT4)**

**11 Side End Angles (MS1)**

**12 Cap Fixed Clevises (MF1)**

**15 Side End Lugs (MS5)**

**16 Sleeve Nut Construction (Universal)**

**20 Head Square Range (MF5)**

**21 Cap Square Range (MF6)**

**22 Detachable Cap Clevises (MF2)**

**32 Cap Fixed Eye (MP3)**

**42 Detachable Cap Eye (MP4)**

**52 Spherical Bearing**

**60 Base Bar (Not NFPA - A & EA Only)**

**Cushion in Head**
- 3 None
- 5 Non-Adjustable Cushion
- 7 Adjustable Cushion (Position 2)

**Cushion in Cap**
- 3 None
- 5 Non-Adjustable Cushion
- 7 Adjustable Cushion (Position 2)

See page ACT-1-96 for complete instructions on how to order cylinders.
## Standard & Optional Rod Ends

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<th>3 1/4&quot; Bore (82.55)</th>
<th>4&quot; Bore (101.60)</th>
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<th>6&quot; Bore (152.40)</th>
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<td>5/8&quot; (15.88)</td>
<td>5/8&quot; (15.88)</td>
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<td>1&quot; (25.40)</td>
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</tr>
</tbody>
</table>

### Footnotes
- All Dimensions in Inches (mm)
- M5, M6, M8, and M10 sizes are optional.
- Thread tolerance: 6H for B Bushing, 5H for C Bushing.
Series A & EA, NFPA Aluminum Air Cylinders (ø1-1/2 to 8")
Series J & EJ, NFPA Steel Air Cylinders (ø1-1/2 to 12’’)

- NFPA (MT1) 7R & 07 Head Trunnion Mount for 7” to 12” bore sizes.
- Series A & J Cylinders rated to 250 PSI air, 400 PSI hydraulic (non-shock).
  Series EA & EJ Cylinders rated to 250 PSI air only.
- Designed for non-lube service.
- Switches available on all bore sizes.
  (See pages ACT-1-90 & 91 for ordering information.)
- Head Trunnions are removable.

Cylinder with 07 (MT1) Head Trunnion

Cylinder Order Information

<table>
<thead>
<tr>
<th>A</th>
<th>Series A Cylinder</th>
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<tr>
<td>J</td>
<td>Series J Cylinder</td>
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<tr>
<td>EJ</td>
<td>Series EJ Cylinder</td>
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</tbody>
</table>

Mounting Options

- 01: Side Tapped (MS4)
- 02: Head Rectangular Flange (MF1)
- 03: Head Square (MS3) - 7” to 12” Bores
- 04: Cap Rectangular Flange (MF2)
- 05: Cap Square (MS4) – 7” to 12” Bores
- 06: Both Ends (4) Tie Rods Ext. (MX1)
- 08: Both Ends (2) Tie Rods Ext. (MX4)
- 7R: Removable Head Trunnion (MT1) - A & EA
- 07: Head Trunnion (MT1) - J & EJ
- 08: Cap Trunnion (MT2) - A & EA
- 09: Side Lugs (MS2)
- 10: Center Trunnion (MT4)
- 11: Side End Angles (MS1)
- 12: Cap Fixed Clevis (MPE1)
- 14: Side End Lugs (MS7)
- 16: Sleeve Nut Construction (Universal)
- 17: Rod Flange (MFS)
- 18: Cap Square Flange (MRE)
- 19: Detachable Cap Clevis (MP2)
- 20: Cap Fixed Eye (MP3)
- 21: Detachable Cap Eye (MP4)
- 22: Spherical Bearing
- 23: Base Bar (Not NFPA - A & EA Only)

Case in Head

- 1: None
- 3: Non-Adjustable Cushion
- 7: Adjustable Cushion (Position 2)
- 9: Decel Cushion

*Standard with EA & EJ

Case in Cap

- 3: None
- 5: Non-Adjustable Cushion
- 7: Adjustable Cushion (Position 2)
- 9: Decel Cushion

*Standard with EA & EJ

See page ACT-1-96 for complete instructions on how to order cylinders.

Piston Rod Threads Type

| 1 | Small Male (Solid) |
| 2 | Intermediate Thread Male (Solid) |
| 3 | Female |
| 6 | Full Thread Male (Solid) |
| 7 | Plain Rod End |

Piston Rod Properies

| A | 5/8” | Standard on 1-1/2”, 2”, 2-1/2” |
| B | 1” | Standard on 3/4”, 4”, 5” |
| C | 1-1/4” | Oversized on 1-1/2”, 2”, 2-1/2” |
| D | 1-1/4” | Standard on 10” |
| E | 2” | Standard on 12” |
| F | 2-1/2” | Oversized on 10”, 12” |

Port and Cushion Adjustment Positions

(As viewed from rod end:
Port standard position 1, Cushion Adjustment standard position 2.)
NOTES: A Port and a Cushion Adjustment cannot be in the same position.
Port or cushion cannot be located in position 2 or 4 on the head end.

Additional Options – order alphabetically – More on page ACT-1-95

- HR: Case Hardened (45 Rc)
- L: Port Location position 1 standard: L(Head Cap)
- MS: Metal Rod Scraper
- N: Cushion Adjust Screw Location position 2 standard: N(Head Cap)
- P: Non-Standard Port Sizes: [specify port size for P( _H) head only, P( _C) cap only, or P( _ ) both head & cap]
- PS: Magnetic Piston – includes aluminum tube option for J & EJ - Std. for Alum
- RS: Rod Stud
- RX: Rod Extensions (specify length of additional rod extension)
- SC: Single Acting Spring Extend (Cap End) – See page ACT-1-86
- SR: Single Acting Spring Retract (Rod End) – See page ACT-1-86
- SS: 303 Stainless Steel (Hard Chrome Plated)
- ST: Stop Tube – specify stop tube length
- TX: Thread Extensions (specify length of thread extension)
- V: Viton® Seals

*1-1/2”, 2”, 2-1/2” bore cylinders have 3/8” NPT Standard, 1/2” NPT oversize.
3-1/4”, 4”, 5” bore cylinders have 1/2” NPT Standard, 3/4” NPT oversize.
3-1/4”, 4”, 5” bore cylinders have 1/2” NPT Standard, 3/4” NPT oversize.
This will add 1/8” to the overall cylinder length.
### Standard & Optional Rod Ends

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<tr>
<th>Type 1 Solid</th>
<th>Type 1 Studded</th>
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<th>Type 2 Solid</th>
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#### Dimension Table

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**Notes:**
- Dimensions in Inches (mm)
- All dimensions are standard unless otherwise specified.
Series A & EA, NFPA Aluminum Air Cylinders (ø1-1/2 to 8")
Series J & EJ, NFPA Steel Air Cylinders (ø1-1/2 to 12")

- NFPA (MT2) 8R & 08 Cap Trunnion Mount for 1-1/2" to 6" bore sizes.
- Series A & J Cylinders rated to 250 PSI air, 400 PSI hydraulic (non-shock).
  Series EA & EJ Cylinders rated to 250 PSI air only.
- Designed for non-lube service.
- Switches available on all bore sizes.
  (See pages ACT-1-90 & 91 for ordering information.)
- Cap Trunnions are removable.

Cylinder with 08 (MT2) Cap Trunnion

Cylinder Order Information

Bore and Stroke (write out)

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Mounting Options

- 01 Side Tapped (MS4)
- 03 Head Rectangular Range (MF1)
- 03 Head Square (ME5) – 7" to 12" Bore
- 04 Cap Rectangular Range (MF2)
- 04 Cap Square (ME6) – 7" to 12" Bore
- 05 Basic Cylinder No Mounting (MX0)
- 06 Both Ends (4) Tie Rods Ext. (MX1)
- 06B Both Ends (2) Tie Rods Ext. (MX4)
- 06C Cap Tie Rods Ext. (M02)
- 06R Head Tie Rods Ext. (MX3)
- 7R Removable Head Trunion (MT1) - A & EA
- 07 Head Trunion (MT1) - J & EJ
- 8R Removable Cap Trunion (MT2) - A & EA
- 08 Cap Trunion (MT2) - J & EJ
- 09 Side Lugs (MS2)
- 10 Center Trunion (MT4)
- 11 Side End Angles (MS1)
- 12 Cap Fixed Clevis (MP1)
- 15 Side End Lugs (MS5)
- 16 Sleeve Nut Construction (Universal)
- 20 Head Square Range (MF5)
- 21 Cap Square Range (MF6)
- 22 Detachable Cap Clevis (MP2)
- 32 Cap Fixed Eye (MP3)
- 42 Detachable Cap Eye (MP4)
- 52 Spherical Bearing
- 80 Base Bar (Not NFPA - A & EA Only)

Cushion in Head

- 3 None
- 5 Non-Adjustable Cushion
- 7 Adjustable Cushion (Position 2)
- 9 Decel Cushion

Cushion in Cap

- 3 None
- 5 Non-Adjustable Cushion
- 7 Adjustable Cushion (Position 2)
- 9 Decel Cushion

See page ACT-1-96 for complete instructions on how to order cylinders.

Additional Options – order alphabetically – More on page ACT-1-95

- HR Case Hardened (45 Rc)
- L Port Location position 1 standard: L (Head Cap)
- (specify position 1 thru 4 for head and/or cap)
- MS Metal Rod Scraper
- N Cushion Adjust Screw Location position 2 standard: N (Head Cap)
- (specify position 1 thru 4 for head and/or cap)
- PI Non-Standard Port Sizes: (specify port size for PI head only, PI_C cap only, or PI both head & cap)
- PS Magnetic Piston – includes aluminum tube option for J & EJ - Std. for Alum
- RS Rod Stud
- Type 1 (5/8" – 1 1/4" eRd)
- Type 2 (5/8" & 1" eRd)
- RX Rod Extensions (specify length of additional rod extension)
- SC Single Acting Spring Extend (Cap End) – See page ACT-1-86
- SR Single Acting Spring Retract (Rod End) – See page ACT-1-86
- SS 303 Stainless Steel (Hard Chrome Plated)
- ST Stop Tube (Cap End) (specify stop tube length)
- ST_I Stop Tube (Rod End) (specify stop tube length)
- T Special Rod Threads (specify rod thread)
- TX Thread extensions (specify length of thread extension)
- V Viton® Seals

Piston Rod Threads Type

- 1 Small Male (Solid)
- 2 Intermediate Thread Male (Solid)
- 3 Female
- 6 Full Thread Male (Solid)
- 7 Plain Rod End

Piston Rod Diameters

- A** 5/8" Standard on 1 1/2", 2", 2 1/2"
- B** 1" Standard on 3", 4", 5"
- C** 1 1/4" Standard on 6", 7", 8"
- D** 1 1/2" Standard on 10"
- E 2" Standard on 12"
- F 2 1/2" Oversized on 10", 12"
- ** A & EA uses A-D only.

*1 1/2", 2", 2 1/2" bore cylinders have 3/8" NPT Standard, 1/2" NPT oversize.
3 1/4", 4", 5" bore cylinders have 1/2" NPT Standard, 3/4" NPT oversize.
This will add 1/8" to the overall cylinder length.

*1 1/2", 2", 2 1/2" bore cylinders have 3/8" NPT Standard, 1/2" NPT oversize.
3 1/4", 4", 5" bore cylinders have 1/2" NPT Standard, 3/4" NPT oversize.
This will add 1/8" to the overall cylinder length.

Port and Cushion Adjustment

Positions (As viewed from rod end:
Port standard position 1, Cushion Adjustment standard position 2.)
NOTES: A Port and a Cushion Adjustment cannot be in the same position.
Port or cushion cannot be located in position 2 or 4 on the cap end.
### Standard & Optional Rod Ends

#### Type 1 Solid
- **(Small Male)**

#### Type 1 Studded
- **(Stud Male Optional)**

#### Type 2 Studded
- **(Intermediate Thread Male Optional)**

#### Type 2 Solid
- **(Intermediate Thread Male Optional)**

#### Type 3 Female
- **(Optional)**

#### Type 6 Solid
- **(Full Thread Male Optional)**

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<th>Dimension</th>
<th>Type 1 Solid</th>
<th>Type 1 Studded</th>
<th>Type 2 Studded</th>
<th>Type 2 Solid</th>
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#### Across
- **Standard & Optional Rod Ends**

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<th>Type 2 Solid</th>
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</table>

### All Dimensions in Inches (mm)
- **Across**
- **Standard & Optional Rod Ends**
- **Type 1 Solid**
- **Type 1 Studded**
- **Type 2 Studded**
- **Type 2 Solid**
- **Type 3 Female**
- **Type 6 Solid**

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**Brookville, OH USA**
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**ACT-1-41**
**Series A & EA, NFPA Aluminum Air Cylinders (ø1-1/2 to 8")**
**Series J & EJ, NFPA Steel Air Cylinders (ø1-1/2 to 12")**

- **NFPA (MT2) 8R & 08 Cap Trunnion Mount** for 7" to 12" bore sizes.
- **Series A & J Cylinders** rated to 250 PSI air, 400 PSI hydraulic (non-shock).
  - **Series EA & EJ Cylinders** rated to 250 PSI air only.
- **Designed for non-lube service.**
- **Switches available on all bore sizes.** (See pages ACT-1-90 & 91 for ordering information.)
- **Cap Trunnions are removable.**

### Cylinder Order Information

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<th>Description</th>
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<td>EA</td>
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<td>EJ</td>
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### Piston Rod Threads

- **A** Standard on 11/2", 2", 21/2"
- **B** Standard on 3/4", 4", 5"
- **C** Standard on 6", 7", 8"
- **D** Standard on 10"
- **E** Standard on 12"
- **F** Oversized on 10", 12"

### Cylinders with 08 (MT2) Cap Trunnion

**Bore and Stroke (write out)**

### Additional Options

- **HR** Case Hardened (45 Rc)
- **L(---)** Port Location position 1 standard: L(Head Cap)
- **MS** Metal Rod Scraper
- **N(---)** Cushion Adjust Screw Location position 2 standard: N(Head Cap)
- **PL** Non-Standard Port Sizes: specify port size for PL_H head only, PL_C cap only, or PL both head & cap
- **PS** Magnetic Piston – includes aluminum tube option for J & EJ - Std. for Alum
- **RS** Rod Stud
  - Type 1 (3/8" – 11/2" eRod)
  - Type 2 (5/8" & 1" eRod)
- **RX** Rod Extensions (specify length of additional rod extension)
- **SC** Single Acting Spring Extend (Cap End) – See page ACT-1-86
- **SR** Single Acting Spring Retract (Rod End) – See page ACT-1-86
- **SS** 303 Stainless Steel (Hard Chrome Plated)
- **ST(---)** Stop Tube (Cap End) (specify stop tube length)
- **TX** Thread Extensions (specify length of thread extension)
- **V** Viton® Seals

### Piston Rod Diameters

- **A** 1/4" Standard on 11/2", 2", 21/2"
- **B** 1" Standard on 3/4", 4", 5"
- **C** Standard on 6", 7", 8"
- **D** Standard on 10"
- **E** Standard on 12"
- **F** Oversized on 10", 12"

### Cushion in Head

- 3 None
- 5 Non-Adjustable Cushion
- 7 Adjustable Cushion (Position 2)
- 9 Decel Cushion

### Cushion in Cap

- 3 None
- 5 Non-Adjustable Cushion
- 7 Adjustable Cushion (Position 2)
- 9 Decel Cushion

**See page ACT-1-96 for complete instructions on how to order cylinders.**
<table>
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Series A & EA, NFPA Aluminum Air Cylinders (ø1-1/2 to 8")
Series J & EJ, NFPA Steel Air Cylinders (ø1-1/2 to 12")

- NFPA (MS2) 09 Side Lug Mount for 1-1/2" to 6" bore sizes.
- Series A & J Cylinders rated to 250 PSI air, 400 PSI hydraulic (non-shock).
- Series EA & EJ Cylinders rated to 250 PSI air only.
- Designed for non-lube service.
- Switches available on all bore sizes. (See pages ACT-1-90 & 91 for ordering information.)

Cylinder Order Information

| 09 |     |     |     |     |

Additional Options — order alphabetically — More on page ACT-1-95

- HR Case Hardened (45 Rc)
- L(.....) Port Location position 1 standard: L(Head Cap)
- (specify position 1 thru 4 for head and/or cap)
- MS Metal Rod Scraper
- N(.....) Cushion Adjust Screw Location position 2 standard: N(Head Cap)
- (specify position 1 thru 4 for head and/or cap)
- P(.....) Non-Standard Port Sizes: [specify port size for P(.....) head only, P(.....) cap only, or P(.....) both head & cap]
- PS Magnetic Piston — includes aluminum tube option for J & EJ — Std. for Alum
- RS Rod Stud
  - Type 1 (5/8" – 1 1/4" ø Rod)
  - Type 2 (5/8" & 1" ø Rod)
- RX Rod Extensions (specify length of additional rod extension)
- SC Single Acting Spring Extend (Cap End) — See page ACT-1-86
- SR Single Acting Spring Retract (Rod End) — See page ACT-1-86
- SS 303 Stainless Steel (Hard Chrome Plated)
- STL(C) Stop Tube (Cap End) (specify stop tube length)
- STL(R) Stop Tube (Rod End) (specify stop tube length)
- T Special Rod Threads (specify rod thread)
- TK Thrust Key
- TX Thread Extensions (specify length of thread extension)
- V Viton® Seals

Piston Rod Threads Type

- 1 Small Male (Solid)
- 2 Intermediate Thread Male (Solid)
- 3 Female
- 6 Full Thread Male (Solid)
- 7 Plain Rod End
- 8 Release Rod End

Piston Rod Diameters

|   |   |

Port and Cushion Adjustment

Positions (As viewed from rod end: Port standard position 1, Cushion Adjustment standard position 2.)

NOTE: A Port and a Cushion Adjustment cannot be in the same position.

See page ACT-1-96 for complete instructions on how to order cylinders.
Series A & EA, NFPA Aluminum Air Cylinders (ø1-1/2 to 8")
Series J & EJ, NFPA Steel Air Cylinders (ø1-1/2 to 12’’)

- NFPA (MS2) 09 Side Lug Mount for 7” to 12” bore sizes.
- Series A & J Cylinders rated to 250 PSI air, 400 PSI hydraulic (non-shock).
- Series EA & EJ Cylinders rated to 250 PSI air only.
- Designed for non-lube service.
- Switches available on all bore sizes.
(See pages ACT-1-90 & 91 for ordering information.)

Cylinder Order Information

09 - - - -

Bore and Stroke (write out)

Mounting Options
- 01 Side Tapped (MS4)
- 03 Head Rectangular Range (MF1)
- 03 Head Square (ME3): 7” to 12” Bore
- 04 Cap Rectangular Range (MF2)
- 04 Cap Square (ME4): 7” to 12” Bore
- 05 Basic Cylinder No Mounting (MD0)
- 06 Both Ends (4) Tie Rods Ext. (MX1)
- 08 Both Ends (2) Tie Rods Ext. (MX4)
- 09 Cap Tie Rods Ext. (M9S)
- 09 Head Tie Rods Ext. (M9S)
- 08 Removable Head Trunion (MT1) - A & EA
- 07 Head Trunion (MT1) - J & EJ
- 08 Cap Trunion (MT2) - J & EJ
- 09 Side Lugs (MS2)
- 10 Center Trunion (MT4)
- 11 Side End Angles (MS1)
- 12 Cap Fixed Clevis (MP1)
- 15 Side End Lugs (MS7)
- 16 Sleeve Nut Construction (Universal)
- 20 Head Square Range (MFS)
- 21 Cap Square Range (MFP)
- 22 Detachable Cap Clevis (MP2)
- 32 Cap Fixed Eye (MP3)
- 42 Detachable Cap Eye (MP4)
- 52 Spherical Bearing
- 60 Base Bar (Not NFPA - A & EA Only)

Cushion in Head
- 3 None
- 5 Non-Adjustable Cushion
- 7 Adjustable Cushion (Position 2)
- 9 Detent Cushion

Cushion in Cap
- 3 None
- 5 Non-Adjustable Cushion
- 7 Adjustable Cushion (Position 2)
- 9 Detent Cushion

See page ACT-1-96 for complete instructions on how to order cylinders.

Additional Options – order alphabetically – More on page ACT-1-95

HR Case Hardened (45 Rc)
L(-... Port Location position 1 standard: L(Head Cap)
specify position 1 thru 4 for head or cap)
MS Metal Rod Scraper
N(-... Cushion Adjust Screw Location position 2 standard: N(Head
specify position 1 thru 4 for head or cap)
P(-... Non-Standard Port Sizes: specify port size for Pl, Ph, cap
only, P(, P(, cap only, or P( both head and cap)
PS Magnetic Piston – includes aluminum tube option for J & EJ - Std. for Alum
RS Rod Stud
Type 1 (5/8” – 1 1/4” Rod)
Type 2 (5/8” & 1” Rod)
RX Rod Extensions (specify length of additional rod extension)
SC Single Acting Spring Extend (Cap End) – See page ACT-1-86
SR Single Acting Spring Retract (Rod End) – See page ACT-1-86
SS 303 Stainless Steel (Hard Chrome Plated)
STU Stop Tube (Cap End) (specify stop tube length)
STU Stop Tube (Stud end) (specify stop tube length)
T Special Rod Threads (specify rod thread)
TK Thrust Key
TX Thread Extensions (specify length of thread extension)
V Viton® Seals

* 1½” to 8” bore cylinders have ¾” NPT Standard, 1½” NPT oversize.
3¼”, 4”, 5” bore cylinders have 1½” NPT Standard, 2½” NPT oversize.
This will add 1½” to the overall cylinder length.

Piston Rod Threads Type
1 Small Male (Solid)
2 Intermediate Thread Male (Solid)
3 Female
6 Full Thread Male (Solid)
7 Plain Rod End

Piston Rod Threads Diameters

A** 5/8” Standard on 1½”, 2”, 2½”
B** 1” Standard on 3¼”, 4”, 5”
C** 1¼” Standard on 6”, 7”, 8”
D** 1½” Standard on 6”, 7”, 8”
E 2” Standard on 10”
F 2½” Oversized on 10”, 12”

Port and Cushion Adjustment Positions (As viewed from rod end: Port standard position 1, Cushion Adjustment standard position 2.)
NOTE: A Port and a Cushion Adjustment cannot be in the same position.

** A & EA uses A-D only.
### Standard & Optional Rod Ends

#### Type 1 Solid
- **Type (Small Male)**
- **Dimension**: 1/4" - 12 (41.28)
- **Bore**: 1/4" - 12 (41.28)
- **Thds.**: 1/8" - 12 (3.60)

#### Type 1 Studded
- **Type (Studded Male Optional)**
- **Dimension**: 1/4" - 12 (41.28)
- **Bore**: 1/4" - 12 (41.28)
- **Thds.**: 1/8" - 12 (3.60)

#### Type 2 Studded
- **Type (Intermediate Thread Male Optional)**
- **Dimension**: 1/4" - 12 (41.28)
- **Bore**: 1/4" - 12 (41.28)
- **Thds.**: 1/8" - 12 (3.60)

#### Type 2 Solid
- **Type (Intermediate Thread Male Optional)**
- **Dimension**: 1/4" - 12 (41.28)
- **Bore**: 1/4" - 12 (41.28)
- **Thds.**: 1/8" - 12 (3.60)

#### Type 3 Female
- **Type (Optional)**
- **Dimension**: 1/4" - 12 (41.28)
- **Bore**: 1/4" - 12 (41.28)
- **Thds.**: 1/8" - 12 (3.60)

#### Type 6 Solid
- **Type (Full Thread Male Optional)**
- **Dimension**: 1/4" - 12 (41.28)
- **Bore**: 1/4" - 12 (41.28)
- **Thds.**: 1/8" - 12 (3.60)

---

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<th>8&quot; Bore (203.20)</th>
<th>10&quot; Bore (254.00)</th>
<th>12&quot; Bore (304.80)</th>
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---

**Series A & EA, NFPA Aluminum Air Cylinders with 09 (MS2) Side Lugs**

**Series J & EJ, NFPA Steel Air Cylinders with 09 (MS2) Side Lugs**

All Dimensions in Inches (mm)

---

**Brookville, OH USA**

Phone 937-833-4033

www.norgren.com
Series A & EA, NFPA Aluminum Air Cylinders (ø1-1/2 to 8")
Series J & EJ, NFPA Steel Air Cylinders (ø1-1/2 to 12”)

- NFPA(MT4) 10 Center Trunnion Mount for 1-1/2” to 6” bore sizes.
- Series A & J Cylinders rated to 250 PSI air, 400 PSI hydraulic (non-shock).
- Series EA & EJ Cylinders rated to 250 PSI air only.
- Designed for non-lube service.
- Switches available on all bore sizes. (See page ACT-1-90 & 91 for ordering information.)

Cylinder with 10 (MT4) Center Trunnion

Cylinder Order Information

<table>
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Cushion in Head
3 None
5 Non-Adjustable Cushion
7 Adjustable Cushion (Position 2)
9 Decel Cushion

Cushion in Cap
3 None
5 Non-Adjustable Cushion
7 Adjustable Cushion (Position 2)
9 Decel Cushion

See page ACT-1-96 for complete instructions on how to order cylinders.
### Standard & Optional Rod Ends

**Type 1 Solid** (Small Male)  
**Type 1 Studded** (Studded Male Optional)  
**Type 2 Studded** (Intermediate Thread Male Optional)  
**Type 2 Solid** (Intermediate Thread Male Optional)  
**Type 3 Female** (Optional)  
**Type 6 Solid** (Full Thread Male Optional)

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**All Dimensions in Inches (mm)**

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**Customer Must Specify XI**

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**Brookville, OH USA**  
Phone 937-833-4033  
[www.norgren.com](http://www.norgren.com)

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**ACT-1-49**
Series A & EA, NFPA Aluminum Air Cylinders (ø1-1/2 to 8")
Series J & EJ, NFPA Steel Air Cylinders (ø1-1/2 to 12")

- NFPA(MT4) 10 Center Trunnion Mount for 7" to 12" bore sizes.
- Series A & J Cylinders rated to 250 PSI air, 400 PSI hydraulic (non-shock).
- Series EA & EJ Cylinders rated to 250 PSI air only.
- Designed for non-lube service.
- Switches available on all bore sizes.
  (See page ACT-1-90 & 91 for ordering information.)

Cylinder Order Information

```
A  Series A Cylinder
EA  Series EA Cylinder
J  Series J Cylinder
EJ  Series EJ Cylinder
```

### Mounting Options
- 01 Side Tapped (MS4)
- 03 Head Rectangular Flange (MF1)
- 03 Head Square (ME8) - 7" to 12" Bores
- 04 Cap Rectangular Flange (MF2)
- 04 Cap Square (ME9) - 7" to 12" Bores
- 05 Basic Cylinder No Mounting (MX0)
- 06 Both Ends (4) Tie Rods Ext. (MX1)
- 06B Both Ends (2) Tie Rods Ext. (MX4)
- 06C Cap Tie Rods Ext. (MX2)
- 06R Head Tie Rods Ext. (MX3)
- 07 Removable Head Trunion (MT1) - A & EA
- 07 Head Trunion (MT1) - J & EJ
- 08 Cap Trunion (MT2) - A & EA
- 08 Cap Trunion (MT2) - J & EJ
- 09 Side Lugs (MS2)
- 10 Center Trunnion (MT4)
- 11 Side End Angles (MS1)
- 12 Cap Fixed Clevis (MP1)
- 15 Side End Lugs (MS7)
- 16 Sleeve Nut Construction (Universal)
- 20 Head Square Range (MF5)
- 21 Cap Square Range (ME6)
- 22 Detachable Cap Clevis (MP2)
- 32 Cap Fixed Eye (MP3)
- 42 Detachable Cap Eye (MP4)
- 52 Spherical Bearing
- 60 Base Bar (Not NFPA - A & EA Only)

See page ACT-1-96 for complete instructions on how to order cylinders.
### ACT-1-51

**Series A & EA, NFPA Aluminum Air Cylinders with 10 (MT4) with Center Trunnion**

**Series J & EJ, NFPA Steel Air Cylinders with 10 (MT4) with Center Trunnion**

All Dimensions in Inches (mm)

---

#### Standard & Optional Rod Ends

- **Type 1 Solid** (Small Male)
- **Type 1 Studded** (Studded Male Optional)
- **Type 2 Solid** (Intermediate Thread Male Optional)
- **Type 2 Studded** (Studded Male Optional)
- **Type 3 Female** (Optional)
- **Type 6 Solid** (Full Thread Male Optional)

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<th>7&quot; Bore (177.80)</th>
<th>8&quot; Bore (203.20)</th>
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● NFPA (MS1) 11 Side End Angle Mount for 1-1/2" to 6" bore sizes.

● Series A & J Cylinders rated to 250 PSI air, 400 PSI hydraulic (non-shock). Series EA & EJ Cylinders rated to 250 PSI air only.

● Designed for non-lube service.

● Switches available on all bore sizes. (See page ACT-1-90 & 91 for ordering information.)

Cylinder with 11 (MS1) Side End Angles

Cylinder Order Information

MOUNTING OPTIONS

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Mounting Options

01 Side Tapped (MS4)
03 Head Rectangular Range (MF1)
03 Head Square Range (ME6) - 7 to 12" Bore
04 Cap Rectangular Range (MF2)
04 Cap Square Range (ME6) - 7 to 12" Bore
05 Basic Cylinder Mounting (MX0)
06 Both Ends (4) Tie Rods Ext. (MX1)
08 Both Ends (2) Tie Rods Ext. (MX4)
6C Cap Tie Rods Ext. (MX2)
6R Head Tie Rods Ext. (MX5)
7R Removable Head Trunnion (MT1) - A & EA
07 Head Trunnion (MT1) - J & EJ
08 Cap Trunnion (MT2) - A & EA
09 Cap Trunnion (MT2) - J & EJ
10 Center Trunnion (MT4)
11 Side End Angles (MS1)
12 Cap Fixed Clevis (MP1)
15 Side End Lugs (MS7)
16 Sleeve Nut Construction (Universal)
20 Head Square Range (MF6)
21 Cap Square Range (MP6)
22 Detachable Cap Clevis (MP2)
32 Cap Fixed Eye (MP3)
42 Detachable Cap Eye (MP4)
52 Spherical Bearing
60 Base Bar (Not NFPA - A & EA Only)

Additional Options – order alphabetically – More on page ACT-1-95

HR Case Hardened (45 Rc)
L(1–4) Port Location position 1 standard: L(Head Cap)
(see position 1 thru 4 for head and/or cap)
MS Metal Rod Scraper
N(1–4) Cushion Adjust Screw Location position 2 standard: N(Head Cap)
(see position 1 thru 4 for head and/or cap)
P(1–3) Non-Standard Port Sizes: [specify port size for P( _H) head only, P( _C) cap only, or P( _H,C) both head & cap]
PS Magnetic Piston – includes aluminum tube option for J & EJ - Std. for Alum
RS Rod Stud
Type 1 (5/8" – 1 3/4" ø Rod)
Type 2 (5/8" & 1" ø Rod)
RX Rod Extensions (specify length of additional rod extension)
SC Single Acting Spring Extend (Cap End) – See page ACT-1-86
SR Single Acting Spring Retract (Rod End) – See page ACT-1-86
SS 303 Stainless Steel (Hard Chrome Plated)
ST(1–2) Stop Tube (Cap End) (specify stop tube length)
ST(1–2) Stop Tube (Rod End) (specify stop tube length)
T Special Rod Threads (specify rod thread)
TX Thread Extensions (specify length of thread extension)
V Viton® Seals

Piston Rod Threads Type

1 Small Male (Solid)
2 Intermediate Thread Male (Solid)
3 Female
6 Full Thread Male (Solid)
7 Plain Rod End

Piston Rod Diameters

<table>
<thead>
<tr>
<th>Type</th>
<th>Diameter</th>
</tr>
</thead>
<tbody>
<tr>
<td>A**</td>
<td>5/8&quot;</td>
</tr>
<tr>
<td>B**</td>
<td>1&quot;</td>
</tr>
<tr>
<td>C**</td>
<td>1 1/8&quot;</td>
</tr>
<tr>
<td>D**</td>
<td>1 1/2&quot;</td>
</tr>
<tr>
<td>E</td>
<td>2&quot;</td>
</tr>
<tr>
<td>F</td>
<td>2 1/2&quot;</td>
</tr>
</tbody>
</table>

** A & EA uses A-D only.

See page ACT-1-96 for complete instructions on how to order cylinders.
● NFPA (MS1) 11 Side End Angle Mount for 7” to 12” bore sizes.

● Series A & J Cylinders rated to 250 PSI air, 400 PSI hydraulic (non-shock).

● Designed for non-lube service.

● Switches available on all bore sizes. (See page ACT-1-90 & 91 for ordering information.)

Cylinder Order Information

- A  Series A Cylinder
- EA  Series EA Cylinder
- J  Series J Cylinder
- EJ  Series EJ Cylinder

Mounting Options
01  Side Tapped (MS4)
03  Head Rectangular Flange (MP1)
03  Head Square (MSB) – 7” to 12” Bores
04  Cap Rectangular Flange (MP2)
04  Cap Square (MSE) – 7” to 12” Bores
05  Basic Cylinder No Mounting (MX0)
06  Both Ends (4) Tie Rods Ext. (MX1)
06  Both Ends (2) Tie Rods Ext. (MX4)
06  Cap Tie Rods Ext. (MX2)
06  Head Tie Rods Ext. (MX3)
07  Removable Head Trunion (MT1) - A & EA
07  Head Trunion (MT1) - J & EJ
08  Cap Trunion (MT2) - A & EA
08  Cap Trunion (MT2) - J & EJ
09  Side Lugs (MS2)
10  Center Trunion (MT4)
11  Side End Angles (MS1)
12  Cap Fixed Clevis (MP1)
15  Side End Lugs (MS5)
16  Sleeve Nut Construction (Universal)
20  Head Square Range (MP5)
21  Cap Square Range (MP6)
22  Detachable Cap Clevis (MP2)
32  Cap Fixed Eye (MP3)
42  Detachable Cap Eye (MP4)
52  Spherical Bearing
60  Base Bar (Not NFPA - A & EA Only)

Cushion in Head
3  None
5  Non-Adjustable Cushion
7  Adjustable Cushion (Position 2)
9  Decel Cushion

Cushion in Cap
3  None
5  Non-Adjustable Cushion
7  Adjustable Cushion (Position 2)
9  Decel Cushion

See page ACT-1-96 for complete instructions on how to order cylinders.
### Standard & Optional Rod Ends

#### Type 1 Solid
(Studded Male Optional)

<table>
<thead>
<tr>
<th>Component</th>
<th>Diameter</th>
</tr>
</thead>
<tbody>
<tr>
<td>ØA</td>
<td>1.3/8&quot;</td>
</tr>
<tr>
<td>ØB</td>
<td>1.3/8&quot;</td>
</tr>
<tr>
<td>ØC</td>
<td>1.3/4&quot;</td>
</tr>
<tr>
<td>ØD</td>
<td>.2&quot;</td>
</tr>
</tbody>
</table>

#### Type 1 Studded
(Studded Male Optional)

<table>
<thead>
<tr>
<th>Component</th>
<th>Diameter</th>
</tr>
</thead>
<tbody>
<tr>
<td>ØA</td>
<td>1.3/8&quot;</td>
</tr>
<tr>
<td>ØB</td>
<td>1.3/8&quot;</td>
</tr>
<tr>
<td>ØC</td>
<td>1.3/4&quot;</td>
</tr>
<tr>
<td>ØD</td>
<td>.2&quot;</td>
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</table>

#### Type 2 Studded
(Intermediate Thread Male Optional)

<table>
<thead>
<tr>
<th>Component</th>
<th>Diameter</th>
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</thead>
<tbody>
<tr>
<td>ØA</td>
<td>1.3/8&quot;</td>
</tr>
<tr>
<td>ØB</td>
<td>1.3/8&quot;</td>
</tr>
<tr>
<td>ØC</td>
<td>1.3/4&quot;</td>
</tr>
<tr>
<td>ØD</td>
<td>.2&quot;</td>
</tr>
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</table>

#### Type 2 Solid
(Intermediate Thread Male Optional)

<table>
<thead>
<tr>
<th>Component</th>
<th>Diameter</th>
</tr>
</thead>
<tbody>
<tr>
<td>ØA</td>
<td>1.3/8&quot;</td>
</tr>
<tr>
<td>ØB</td>
<td>1.3/8&quot;</td>
</tr>
<tr>
<td>ØC</td>
<td>1.3/4&quot;</td>
</tr>
<tr>
<td>ØD</td>
<td>.2&quot;</td>
</tr>
</tbody>
</table>

#### Type 3 Female
(Optional)

<table>
<thead>
<tr>
<th>Component</th>
<th>Diameter</th>
</tr>
</thead>
<tbody>
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<td>ØA</td>
<td>1.3/8&quot;</td>
</tr>
<tr>
<td>ØB</td>
<td>1.3/8&quot;</td>
</tr>
<tr>
<td>ØC</td>
<td>1.3/4&quot;</td>
</tr>
<tr>
<td>ØD</td>
<td>.2&quot;</td>
</tr>
</tbody>
</table>

#### Type 6 Solid
(Full Thread Male Optional)

<table>
<thead>
<tr>
<th>Component</th>
<th>Diameter</th>
</tr>
</thead>
<tbody>
<tr>
<td>ØA</td>
<td>1.3/8&quot;</td>
</tr>
<tr>
<td>ØB</td>
<td>1.3/8&quot;</td>
</tr>
<tr>
<td>ØC</td>
<td>1.3/4&quot;</td>
</tr>
<tr>
<td>ØD</td>
<td>.2&quot;</td>
</tr>
</tbody>
</table>

### Dimensions

<table>
<thead>
<tr>
<th>Dimension</th>
<th>7&quot; Bore (177.80)</th>
<th>8&quot; Bore (203.20)</th>
<th>10&quot; Bore (254.00)</th>
<th>12&quot; Bore (304.80)</th>
</tr>
</thead>
<tbody>
<tr>
<td>ØA</td>
<td>Std. 1 7/8&quot; (44.45)</td>
<td>Std. 1 7/8&quot; (44.45)</td>
<td>Std. 1 3/4&quot; (50.80)</td>
<td>Std. 2&quot; (50.80)</td>
</tr>
<tr>
<td>ØB</td>
<td>Std. 1.875 (47.92)</td>
<td>Std. 1.875 (47.92)</td>
<td>Std. 2.000 (50.80)</td>
<td>Std. 2.500 (63.50)</td>
</tr>
<tr>
<td>ØC</td>
<td>Std. 2.000 (50.80)</td>
<td>Std. 2.000 (50.80)</td>
<td>Std. 2.250 (57.15)</td>
<td>Std. 3.000 (76.20)</td>
</tr>
<tr>
<td>ØD</td>
<td>Std. .200 (5.08)</td>
<td>Std. .200 (5.08)</td>
<td>Std. .250 (6.35)</td>
<td>Std. .250 (6.35)</td>
</tr>
</tbody>
</table>

### Types

<table>
<thead>
<tr>
<th>Type</th>
<th>Description</th>
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</thead>
<tbody>
<tr>
<td>1</td>
<td>Standard &amp; Optional Rod Ends</td>
</tr>
<tr>
<td>2</td>
<td>Standard &amp; Optional Rod Ends</td>
</tr>
<tr>
<td>3</td>
<td>Standard &amp; Optional Rod Ends</td>
</tr>
<tr>
<td>4</td>
<td>Standard &amp; Optional Rod Ends</td>
</tr>
<tr>
<td>5</td>
<td>Standard &amp; Optional Rod Ends</td>
</tr>
<tr>
<td>6</td>
<td>Standard &amp; Optional Rod Ends</td>
</tr>
</tbody>
</table>
Nordgren Series A & EA, NFPA Aluminum Air Cylinders (ø1-1/2 to 8"")
Series J & EJ, NFPA Steel Air Cylinders (ø1-1/2 to 12"")

- **NFPA (MP1) 12 Cap Fixed Clevis Mount** for 1-1/2" to 6" steel bore sizes.
- **Series A & J Cylinders** rated to 250 PSI air, 400 PSI hydraulic (non-shock).
  - **Series EA & EJ Cylinders** rated to 250 PSI air only.
- **Designed for non-lube service.**
- **Switches available on all bore sizes.** (See pages ACT-1-90 & 91 for ordering information.)

---

**Cylinder with 12 (MP1) Cap Fixed Clevis**

**Cylinder Order Information**

<table>
<thead>
<tr>
<th>12</th>
<th>-</th>
<th>-</th>
<th>-</th>
</tr>
</thead>
</table>

**See page ACT-1-96 for complete instructions on how to order cylinders.**

---

**Mounting Options**

- 01 Side Tapped (MS4)
- 03 Head Rectangular Range (MP1)
- 04 Cap Rectangular Range (MP2)
- 05 Cap Square (M64) – 7" to 12" Bores
- 06 Basic Cylinder No Mounting (M00)
- 07 Both Ends (4) Tie Rods Ext. (M81)
- 08 Both Ends (2) Tie Rods Ext. (M84)
- 09 Cap Tie Rods Ext. (M92)
- 12 Head Tie Rods Ext. (M93)
- 13 Removable Head Trunion (MT1) – A & EA
- 15 Center Trunion (MT14)
- 11 Side End Angles (M15)
- 12 Cap Fixed Clevis (MP1)
- 15 Side End Lugs (MS7)
- 16 Sleeve Nut Construction (Universal)
- 20 Head Square Range (M56)
- 21 Cap Square Range (M60)
- 22 Detachable Cap Clevis (MP3)
- 32 Cap Fixed Eye (MP3)
- 42 Detachable Cap Eye (MP4)
- 52 Spherical Bearing
- 60 Base Bar (Not NFPA – A & EA Only)

**Cushion in Head**

- 3 None
- 5 Non-Adjustable Cushion
- 7 Adjustable Cushion (Position 2)
- 9 Decel Cushion

**Cushion in Cap**

- 3 None
- 5 Non-Adjustable Cushion
- 7 Adjustable Cushion (Position 2)
- 9 Decel Cushion

**NOTE:** A Port and a Cushion Adjustment cannot be in the same position.

- **Standard with EA & EJ**
- **Standard with EA & EA Only**

---

**Bore and Stroke (write out)****

**Port and Cushion Adjustment Positions** (As viewed from rod end: Port standard position 1, Cushion Adjustment standard position 2)

- **Port positioning**:
  - 1 Standard position 1
  - 2 Standard position 2
  - 3 Female
  - 4 Full Thread Male
  - 5 Plain Rod End

- **Cushion positioning**:
  - 1 Non-Adjustable Cushion
  - 3 Adjustable Cushion (Position 2)
  - 5 Decel Cushion

**Cushion in Head**

- 3 None
- 5 Non-Adjustable Cushion
- 7 Adjustable Cushion (Position 2)
- 9 Decel Cushion

**Cushion in Cap**

- 3 None
- 5 Non-Adjustable Cushion
- 7 Adjustable Cushion (Position 2)
- 9 Decel Cushion

**NOTE:** A Port and a Cushion Adjustment cannot be in the same position.

---

**Piston Rod Threads Type**

- 1 Small Male (Solid)
- 2 Intermediate Thread Male (Solid)
- 3 Female
- 4 Fully Thread Male (Solid)
- 5 Plain Rod End

**Piston Rod Thread diameters**

- A** 9/16" Standard on 1-1/2", 2", 2-1/2"
- B** 1" Standard on 3-1/4", 4", 5"
- C** 3/4" Standard on 6-1/2", 7", 8"
- D** 1-1/4" Standard on 10" (oversized on 6-1/2", 7", 8"
- E 2" Standard on 12" (oversized on 6-1/2", 7", 8"
- F 2-1/2" Oversized on 10", 12"

**NOTE:** A & EA uses A-D only.
NORCplen

Series A & EA, NFPA Aluminum Air Cylinders (ø1-1/2 to 8")
Series J & EJ, NFPA Steel Air Cylinders (ø1-1/2 to 12")

- NFPA (MP1) 12 Cap Fixed Clevis Mount for 7” to 12” steel bore sizes.
- Series A & J Cylinders rated to 250 PSI air, 400 PSI hydraulic (non-shock).
  Series EA & EJ Cylinders rated to 250 PSI air only.
- Designed for non-lube service.
- Switches available on all bore sizes.
  (See pages ACT-1-90 & 91 for ordering information.)

Cylinder Order Information

See page ACT-1-96 for complete instructions on how to order cylinders.
**Series A & EA, NFPA Aluminum Air Cylinder with 12 (MP1) Cap Fixed Clevis**

**Series J & EJ, NFPA Steel Air Cylinder with 12 (MP1) Cap Fixed Clevis**

All Dimensions in Inches (mm)

### Standard & Optional Rod Ends

- **Type 1 Solid** (Small Male)
- **Type 1 Studded** (Stud Male Optional)
- **Type 2 Studded** (Intermediate Thread Male Optional)
- **Type 2 Solid** (Intermediate Thread Male Optional)
- **Type 3 Female** (Optional)
- **Type 6 Solid** (Full Thread Male Optional)

### Dimensions

<table>
<thead>
<tr>
<th>Dimension</th>
<th>7&quot; Bore (177.80)</th>
<th>8&quot; Bore (203.20)</th>
<th>10&quot; Bore (254.00)</th>
<th>12&quot; Bore (304.80)</th>
</tr>
</thead>
<tbody>
<tr>
<td>ø Rod</td>
<td>Std.</td>
<td>O.S.</td>
<td>Std.</td>
<td>O.S.</td>
</tr>
<tr>
<td>A</td>
<td>1 3/4&quot; (34.93)</td>
<td>1 3/4&quot; (34.93)</td>
<td>1 3/4&quot; (44.45)</td>
<td>2&quot; (50.80)</td>
</tr>
<tr>
<td>B</td>
<td>2.000</td>
<td>2.000</td>
<td>2.000</td>
<td>2.250</td>
</tr>
<tr>
<td>C</td>
<td>7.500</td>
<td>7.500</td>
<td>7.500</td>
<td>8.750</td>
</tr>
<tr>
<td>CB</td>
<td>1.500</td>
<td>1.500</td>
<td>2.000</td>
<td>2.500</td>
</tr>
</tbody>
</table>

### Across Flats

- **A**
- **C**
- **K**
- **P**
- **VF**

### Optional Pin

- Supplied with Standard Pin (See page 145)

---

**Note:** For detailed specifications and additional options, please refer to page 145.
Series A & EA, NFPA Aluminum Air Cylinders (ø1-1/2 to 8")
Series J & EJ, NFPA Steel Air Cylinders (ø1-1/2 to 8")

- NFPA (MS7) 15 End Lug Mount for 1-1/2" to 8" bore sizes.
- Series A & J Cylinders rated to 250 PSI air, 400 PSI hydraulic (non-shock).
- Series EA & EJ Cylinders rated to 250 PSI air only.
- Designed for non-lube service.
- Switches available on all bore sizes. (See pages ACT-1-90 & 91 for ordering information.)

Cylinder with 15 (MS7) Side End Lugs

Cylinder Order Information

15 - - - -

Bore and Stroke (write out)

See page ACT-1-96 for complete instructions on how to order cylinders.
### Table: Cylinder Dimensions

<table>
<thead>
<tr>
<th>Type</th>
<th>Dimension</th>
<th>1 1/2&quot; Bore (38.10)</th>
<th>2&quot; Bore (50.80)</th>
<th>2 1/2&quot; Bore (63.50)</th>
<th>3 1/4&quot; Bore (82.55)</th>
<th>4&quot; Bore (101.60)</th>
<th>5&quot; Bore (127.00)</th>
<th>6&quot; Bore (152.40)</th>
<th>7&quot; Bore (177.80)</th>
<th>8&quot; Bore (203.20)</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Type 1 Solid</strong> (Small Male)</td>
<td>Ø2.220</td>
<td>2.220</td>
<td>2.220</td>
<td>2.630</td>
<td>2.630</td>
<td>3.063</td>
<td>3.063</td>
<td>3.063</td>
<td>1.840</td>
<td>1.840</td>
</tr>
<tr>
<td><strong>Type 3 Female (Optional)</strong></td>
<td>Ø2.220</td>
<td>2.220</td>
<td>2.220</td>
<td>2.630</td>
<td>2.630</td>
<td>3.063</td>
<td>3.063</td>
<td>3.063</td>
<td>1.840</td>
<td>1.840</td>
</tr>
</tbody>
</table>

### Notes:
- **B** ø - Bore Size
- **C** - Flats
- **CEF** - Across Flats
- **CCB** - Series A & EA, NFPA Aluminum Air Cylinder with 15 (MS7) Side End Lugs
- **BE** - Type 6 Solid 
- **G** - Optional
- **C** - Female
- **CC** - CCBE + Stroke
- **SE** - + Stroke
- **XE** - + Stroke
- **PL** - + Stroke
- **EO** - + Stroke

---

**Brookville, OH USA**
Phone 937-833-4033 www.norgren.com

**ACT-1-61**
Series A & EA, NFPA Aluminum Air Cylinders (ø1-1/2 to 6")
Series J & EJ, NFPA Steel Air Cylinders (ø1-1/2 to 6")

- 16 Sleeve Nut Construction Side Tapped (Universal Mount) for 1-1/2" to 6" bore sizes.
- Series A & J Cylinders rated to 250 PSI air, 400 PSI hydraulic (non-shock).
  Series EA & EJ Cylinders rated to 250 PSI air only.
- Designed for non-lube service.
- Switches available on all bore sizes.
  (See pages ACT-1-90 & 91 for ordering information.)

Cylinder Order Information

| 16 | - | - | - | - |

Bore and Stroke (write out)

Mounting Options
- 01 Side Tapped (MS4)
- 03 Head Rectangular Range (MF1)
- 04 Cap Rectangular Range (MP2)
- 05 Basic Cylinder No Mounting (MX0)
- 06 Both Ends (4) Tie Rods Ext. (MX1)
- 08 Both Ends (2) Tie Rods Ext. (MX4)
- 09 Cap Tie Rods Ext. (MX2)
- 06 Head Tie Rods Ext. (MX3)
- 07 Removable Head Trunion (MT11) - A & EA
- 07 Head Trunion (MT11) - J & EJ
- 08 Cap Trunion (MT12) - A & EA
- 10 Center Trunion (MT14)
- 11 Side End Angles (MS1)
- 12 Cap Fixed Clevis (MP1)
- 15 Side End Lugs (MS7)
- 16 Sleeve Nut Construction (Universal)
- 20 Head Square Range (MF5)
- 21 Cap Square Range (MP6)
- 22 Detachable Cap Clevis (MP2)
- 32 Cap Fixed Eye (MP9)
- 42 Detachable Cap Eye (MP4)
- 52 Spherical Bearing
- 60 Base Bar (Not NFPA - A & EA Only)

See page ACT-1-96 for complete instructions on how to order cylinders.

Cushion in Head
- 3 None
- 5 Non-Adjustable Cushion
- 7 Adjustable Cushion (Position 2)
- 9 Decel Cushion
- *Standard with EA & EJ

Cushion in Cap
- 3 None
- 5 Non-Adjustable Cushion
- 7 Adjustable Cushion (Position 2)
- 9 Decel Cushion
- *Standard with EA & EJ

See page ACT-1-96 for complete instructions on how to order cylinders.

Piston Rod Threads
- 1 Small Male (Solid)
- 2 Intermediate Thread Male (Solid)
- 3 Female
- 6 Full Thread Male (Solid)
- 7 Plain Rod End

Piston Rod Connections
- T Special Rod Threads (specify rod thread)
- TX Thread Extensions (specify length of thread extension)
- V Viton® Seals

** HR Case Hardened (45 Rc)
** MS Metal Rod Scraper
** NL... Cushion Adjust Screw Location position 2 standard: N(Head)
** PL... Non-Standard Port Sizes: [specify port size for PL head only, PL cap only, or PL both head & cap]
** PS Magnetic Piston – includes aluminum tube option for J & EJ - Std. for Alum

Port and Cushion Adjustment Positions (As viewed from rod end: Port standard position 1, Cushion Adjustment standard position 2.)

NOTE: A Port and a Cushion Adjustment cannot be in the same position.

1 Small Male (Solid)
2 Intermediate Thread Male (Solid)
3 Female
6 Full Thread Male (Solid)
7 Plain Rod End

See page ACT-1-96 for complete instructions on how to order cylinders.

1 2 3 4

Port standard position 1, Cushion Adjustment standard position 2.

NOTE: A Port and a Cushion Adjustment cannot be in the same position.

Bore and Stroke (write out)
### Standard & Optional Rod Ends

**Type 1 Solid** (Small Male)

**Type 2 Studded** (Intermediate Thread Male Optional)

**Type 2 Solid** (Intermediate Thread Male Optional)

**Type 3 Female** (Optional)

**Type 6 Solid** (Full Thread Male Optional)

### Table: Dimensions

<table>
<thead>
<tr>
<th>Dimension</th>
<th>1/16&quot; Bore (38.10)</th>
<th>2&quot; Bore (50.80)</th>
<th>2½/8&quot; Bore (63.50)</th>
<th>3¼/8&quot; Bore (82.55)</th>
<th>4&quot; Bore (101.60)</th>
<th>5&quot; Bore (127.00)</th>
<th>6&quot; Bore (152.40)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Std.</td>
<td>5/8&quot; (15.88)</td>
<td>5/8&quot; (15.88)</td>
<td>5/8&quot; (15.88)</td>
<td>1&quot; (25.40)</td>
<td>1&quot; (25.40)</td>
<td>1&quot; (25.40)</td>
<td>1¼&quot; (31.75)</td>
</tr>
<tr>
<td>G.S.</td>
<td>1&quot; (25.40)</td>
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### Footnotes:

- All Dimensions in Inches (mm)
- Brookville, OH USA Phone 937-833-4033 www.norgren.com
- ACT-1-63

![Diagram of Rod Ends](attachment:image)
**NFPA (MF5) 20 Head Square Flange Mount**

- for 1-1/2" to 6" bore sizes.

**Series A & J Cylinders rated to 250 PSI air, 400 PSI hydraulic (non-shock).**
- Series EA & EJ Cylinders rated to 250 PSI air only.

**Designed for non-lube service.**

- Switches available on all bore sizes.
  (See pages ACT-1-90 & 91 for ordering information.)

---

### Cylinder Order Information

#### Cylinder with 20 (MF5) Head Square Flange

<table>
<thead>
<tr>
<th>Bore and Stroke (write out)</th>
</tr>
</thead>
</table>

#### Mounting Options

- 01 Side Tapped (MS4)
- 02 Head Rectangular Flange (MF1)
- 03 Head Square Flange (ME1) – 7" to 12" Bore
- 04 Cap Rectangular Flange (MF2)
- 05 Cap Square Flange (ME2)
- 06 Basic Cylinder No Mounting (MX0)
- 07 Basic Cylinder Square Flange Both Ends (MX1)
- 08 Basic Cylinder Square Flange Both Ends (MX4)
- 09 Cap Tie Rods Ext. (MX2)
- 10 Head Tie Rods Ext. (MX3)
- 11 Removable Head Trunion (MT1) - A & EA
- 12 Head Trunion (MT1) - J & EJ
- 13 Cap Trunion (MT2) - A & EA
- 14 Cap Trunion (MT2) - J & EJ
- 15 Side Lugs (MS2)
- 16 Side End Angles (MS1)
- 17 Cap Fixed Clevis (MP1)
- 18 Cap Fixed Clevis (MP1)
- 19 Sleeve Nut Construction (Universal)
- 20 Head Square Flange (MF5)
- 21 Cap Square Flange (MF6)
- 22 Detachable Cap Clevis (MP2)
- 23 Cap Fixed Eye (MP3)
- 24 Detachable Cap Eye (MP4)
- 25 Spherical Bearing
- 26 Base Bar (Not NFPA - A & EA Only)

#### Piston Rod Threads

- Type 1 (5/8" – 1 3/4"
- Type 2 (5/8" & 1"
- Type 3 (5/8" – 1 3/4"
- Type 4 (5/8" – 1"
- Type 5 (5/8" – 1"
- Type 6 (5/8" – 1"
- Type 7 (5/8" – 1"
- Type 8 (5/8" – 1"
- Type 9 (5/8" – 1"

---

**Cushion in Head**

- 3 None
- 5 Non-Adjustable Cushion
- 7 Adjustable Cushion (Position 2)
- 9 Decel Cushion

**Cushion in Cap**

- 3 None
- 5 Non-Adjustable Cushion
- 7 Adjustable Cushion (Position 2)
- 9 Decel Cushion

**Standard with EA & EJ**

---

See page ACT-1-96 for complete instructions on how to order cylinders.
### Standard & Optional Rod Ends

<table>
<thead>
<tr>
<th>Dimension</th>
<th>1 1/2&quot; Bore (38.10)</th>
<th>2&quot; Bore (50.80)</th>
<th>2 1/2&quot; Bore (63.50)</th>
<th>3 1/4&quot; Bore (82.53)</th>
<th>4&quot; Bore (101.60)</th>
<th>5&quot; Bore (127.00)</th>
<th>6&quot; Bore (152.40)</th>
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<td>5/8&quot; (15.88)</td>
<td>5/8&quot; (15.88)</td>
<td>1&quot; (25.40)</td>
<td>1&quot; (25.40)</td>
<td>1&quot; (25.40)</td>
<td>1 1/4&quot; (31.75)</td>
<td>1 1/4&quot; (31.75)</td>
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<tr>
<td>C Std.</td>
<td>1 1/2&quot; (38.10)</td>
<td>1 1/2&quot; (38.10)</td>
<td>1 1/2&quot; (38.15)</td>
<td>1 1/2&quot; (38.15)</td>
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<td>B Std.</td>
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</table>

### Series A & EA, NFPA Aluminum Air Cylinders with 20 (MF5) Head Square Flange

- **Type 1 Solid** (Small Male)
- **Type 1 Studded** (Studded Male Optional)
- **Type 2 Studded** (Intermediate Thread Male Optional)
- **Type 2 Solid** (Intermediate Thread Male Optional)
- **Type 3 Female** (Optional)
- **Type 6 Solid** (Full Thread Male Optional)

### All Dimensions in Inches (mm)

- **W Std.**: 4.75 (120.65) 4.90 (124.46) 5.06 (128.60) 6.00 (152.40) 6.00 (152.40) 6.31 (160.00) 7.06 (179.30)
- **C Std.**: 5.25 (133.35) 5.31 (134.35) 5.43 (138.11) 6.25 (158.75) 6.25 (158.75) 6.56 (168.60) 7.31 (185.74)
Series A & EA, NFPA Aluminum Air Cylinders (ø1-1/2 to 6")
Series J & EJ, NFPA Steel Air Cylinders (ø1-1/2 to 6”)

- NFPA (MF6) 21 Cap Square Flange Mount for 1-1/2" to 6" bore sizes.
- Series A & J Cylinders rated to 250 PSI air, 400 PSI hydraulic (non-shock).
  Series EA & EJ Cylinders rated to 250 PSI air only.
- Designed for non-lube service.
- Switches available on all bore sizes.
  (See pages ACT-1-90 & 91 for ordering information.)

Cylinder with 21 (MF6) Cap Square Flange

Cylinder Order Information

<table>
<thead>
<tr>
<th>Bore and Stroke (write out)</th>
</tr>
</thead>
</table>

Mounting Options
- 01 Side Tapped (MS4)
- 02 Head Rectangular Flange (MF1)
- 03 Head Square (ME3) – 7" to 12" Bores
- 04 Cap Rectangular Flange (MF2)
- 05 Cap Square (ME6) – 7" to 12" Bores
- 06 Both Ends (4) Tie Rods Ext. (MX1)
- 08 Both Ends (2) Tie Rods Ext. (MX4)
- 06C Cap Tie Rods Ext. (MX2)
- 06R Head Tie Rods Ext. (MX3)
- 07 Removable Head Trunnion (MT1) – A & EA
- 08 Head Trunnion (MT1) – J & EJ
- 09 Cap Trunnion (MT2) – A & EA
- 08 Cap Trunnion (MT2) – J & EJ
- 09 Side Lugs (MS2)
- 10 Center Trunnion (MT4)
- 11 Side End Angles (MS1)
- 12 Cap Fixed Clevis (MP1)
- 14 Side End Lugs (MS7)
- 16 Sleeve Nut Construction (Universal)
- 20 Head Square Range (MF5)
- 21 Cap Square Flange (MF6)
- 22 Detachable Cap Clevis (MP2)
- 32 Cap Fixed Eye (MP3)
- 42 Detachable Cap Eye (MP4)
- 52 Spherical Bearing
- 60 Base Bar (Not NFPA – A & EA Only)

**Note:**
- Standard with EA & EJ

Series A Cylinder
- EA Series EA Cylinder
- J Series J Cylinder
- EJ Series EJ Cylinder

See page ACT-1-96 for complete instructions on how to order cylinders.

Additional Options – order alphabetically – More on page ACT-1-95

- HR Case Hardened (45 Rc)
- I(→) Port Location position 1 standard: I(Head Cap) (specify position 1 thru 4 for head and/or cap)
- MS Metal Rod Scraper
- N(→) Cushion Adjust Screw Location position 2 standard: N(Head Cap) (specify position 1 thru 4 for head and/or cap)
- P(→)* Non-Standard Port Sizes: [specify port size for P(→) head only, P(→) cap only, or P(→) both head & cap]
- PS Magnetic Piston – includes aluminum tube option for J & EJ - Std. for Alum
- RS Rod Stud
  - Type 1 (5/8" – 1 3/4" ø Rod)
  - Type 2 (5/8" & 1" ø Rod)
- RX Rod Extensions (specify length of additional rod extension)
  - SC Single Acting Spring Extend (Cap End) – See page ACT-1-86
  - SR Single Acting Spring Retract (Rod End) – See page ACT-1-86
- SS 303 Stainless Steel (Hard Chrome Plated)
- ST Stop Tube (Cap End) (specify stop tube length)
  - ST(R) Stop Tube (Rod End) (specify stop tube length)
- V Viton® Seals

Piston Rod Threads Type
- 1 Small Male (Solid)
- 2 Intermediate Thread Male (Solid)
- 3 Female
- 6 Full Thread Male (Solid)
- 7 Plain Rod End

Port and Cushion Adjustment Positions
- Port and Cushion Adjustment
  - (As viewed from rod end: Port standard position 1, Cushion Adjustment standard position 2.)
  - NOTE: A Port and a Cushion Adjustment cannot be in the same position.

Piston Rod Threads
- **A**
  - 5/8" Standard on 1 1/2", 2", 2 1/2"

- **B**
  - 1" Standard on 3 1/4", 4", 5"
  - Oversized on 1 1/2", 2", 2 1/2"

- **C**
  - 1 1/4" Standard on 6", 7", 8"
  - Oversized on 3 1/4", 4", 5"

- **D**
  - 1 1/4" Standard on 10"
  - Oversized on 6", 7", 8"

- **E**
  - 2" Standard on 12"
  - Oversized on 10"

- **F**
  - 2 1/2" Oversized on 10", 12"

* A & EA uses A-D only.

---

**See page ACT-1-96 for complete instructions on how to order cylinders.**
### Standard & Optional Rod Ends

#### Type 1 Solid (Small Male)
- Across Thds.
- Rod Std.
- VF Std.
- MM Std.
- FF Std.
- FB
- E
- KK Std.
- CC Std.
- C
- O.S.
- O.S.
- O.S.
- O.S.
- O.S.
- O.S.

#### Type 1 Studded (Studded Male Optional)
- Across Thds.
- Rod Std.
- VF Std.
- MM Std.
- FF Std.
- FB
- E
- KK Std.
- CC Std.
- C
- O.S.
- O.S.
- O.S.
- O.S.
- O.S.
- O.S.

#### Type 2 Studded (Intermediate Thread Male Optional)
- Across Thds.
- Rod Std.
- VF Std.
- MM Std.
- FF Std.
- FB
- E
- KK Std.
- CC Std.
- C
- O.S.
- O.S.
- O.S.
- O.S.
- O.S.
- O.S.

#### Type 2 Solid (Intermediate Thread Male Optional)
- Across Thds.
- Rod Std.
- VF Std.
- MM Std.
- FF Std.
- FB
- E
- KK Std.
- CC Std.
- C
- O.S.
- O.S.
- O.S.
- O.S.
- O.S.
- O.S.

#### Type 3 Female (Optional)
- Across Thds.
- Rod Std.
- VF Std.
- MM Std.
- FF Std.
- FB
- E
- KK Std.
- CC Std.
- C
- O.S.
- O.S.
- O.S.
- O.S.
- O.S.
- O.S.

#### Type 6 Solid (Full Thread Male Optional)
- Across Thds.
- Rod Std.
- VF Std.
- MM Std.
- FF Std.
- FB
- E
- KK Std.
- CC Std.
- C
- O.S.
- O.S.
- O.S.
- O.S.
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### Dimensions

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### Series A & EA, NFPA Aluminum Air Cylinder with 21 (MF6) Cap Square Flange

- Series J & EJ, NFPA Steel Air Cylinder with 21 (MF6) Cap Square Flange

---

**Dimensions:**

- **Studs**
- **LB + Stroke**
- **EE NPT (2)**
- **FB Holes (8)**
- **Type 3 Female (Optional)**

---

**Series:**

- **Series J & EJ, NFPA Steel Air Cylinder with 21 (MF6) Cap Square Flange**

---

**Contact:**

- Brookville, OH USA
- Phone 937-833-4033
- www.norgren.com

---

**All Dimensions in Inches (mm)**
**Series A & EA, NFPA Aluminum Air Cylinders (ø1-1/2 to 8")**

- **NFPA (MP2) 22 Detachable Cap Clevis Mount for 1-1/2" to 8" bore sizes.**

- **Series A & J Cylinders rated to 250 PSI air, 400 PSI hydraulic (non-shock).**
  Series EA & EJ Cylinders rated to 250 PSI air only.

- **Designed for non-lube service.**

- **Switches available on all bore sizes.** (See pages ACT-1-90 & 91 for ordering information.)

---

**Cylinder with 22 (MP2) Detachable Cap Clevis**

---

**Cylinder Order Information**

- **Bore and Stroke** (write out)  

---

### Mounting Options
- 01 Side Tapped (MS4)
- 03 Head Rectangular Range (MF1)
- 03 Head Square (MED) - 7 to 12" Bores
- 04 Cap Rectangular Range (MP2)
- 04 Cap Square (MED) - 7 to 12" Bores
- 05 Basic Cylinder No Mounting (MX0)
- 06 Both Ends (4) Tie Rods Ext. (MX1)
- 6C Cap Tie Rods Ext. (MX2)
- 6R Head Tie Rods Ext. (MX3)
- 7R Removable Head Trunnion (MT1) - A & EA
- 07 Head Trunnion (MT1) - J & EJ
- 08 Cap Trunnion (MT2) - A & EA
- 09 Side Lugs (MS2)
- 10 Center Trunnion (MT4)
- 11 Side End Angles (MS1)
- 12 Cap Fixed Clevis (MP1)
- 15 Side End Lugs (MS7)
- 16 Sleeve Nut Construction (Universal)
- 20 Head Square Range (MP5)
- 21 Cap Square Range (MP6)
- 22 Detachable Cap Clevis (MP2)
- 32 Cap Fixed Eye (MP3)
- 42 Detachable Cap Eye (MP4)
- 52 Spherical Bearing
- 60 Base Bar (Not NFPA - A & EA Only)

---

### Cushion in Head
- 3 None
- 5 Non-Adjustable Cushion
- 7 Adjustable Cushion (Position 2)
- 9 Decal Cushion

**Standard with EA & EJ**

### Cushion in Cap
- 3 None
- 5 Non-Adjustable Cushion
- 7 Adjustable Cushion (Position 2)
- 9 Decal Cushion

**Standard with EA & EJ**

---

See page ACT-1-96 for complete instructions on how to order cylinders.

---

**Piston Rod Threads Type**
- 1 Small Male (Solid)
- 2 Intermediate Thread Male (Solid)
- 3 Female
- 6 Full Thread Male (Solid)
- 7 Plain Rod End

---

**Piston Rod Diameter**
- A Standard on 1-1/2", 2", 2-1/2"
- B Standard on 3/4", 4", 5" Oversized on 1-1/2", 2", 2-1/2"
- C Standard on 6", 7", 8" Oversized on 3/4", 4", 5"
- D Standard on 10" Oversized on 6", 7", 8"
- E Standard on 12" Oversized on 10"
- F 2-1/2" Oversized on 10", 12"

---

**Port and Cushion Adjustment Positions** (As viewed from rod end: Port standard position 1, Cushion Adjustment standard position 2.)

**NOTE:** A Port and a Cushion Adjustment cannot be in the same position.
### Standard & Optional Rod Ends

#### Type 1 Solid (Small Male)

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<th>Dimension</th>
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#### Type 1 Studded (Studded Male Optional)

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#### Type 2 Studded (Intermediate Thread Male Optional)

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#### Type 2 Solid (Intermediate Thread Male Optional)

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<thead>
<tr>
<th>Dimension</th>
<th>1&quot; Bore (25.40)</th>
<th>1-1/4&quot; Bore (31.75)</th>
<th>1-1/2&quot; Bore (41.28)</th>
<th>1-1/4&quot; Bore (31.75)</th>
</tr>
</thead>
<tbody>
<tr>
<td>eB Bushing</td>
<td>eB Bushing</td>
<td>eB Bushing</td>
<td>eB Bushing</td>
<td>eB Bushing</td>
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<tr>
<td>eMM</td>
<td>eMM</td>
<td>eMM</td>
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#### Type 3 Female (Optional)

<table>
<thead>
<tr>
<th>Dimension</th>
<th>1-1/2&quot; Bore (38.10)</th>
<th>2&quot; Bore (50.80)</th>
<th>2-1/2&quot; Bore (63.50)</th>
<th>3&quot; Bore (76.20)</th>
<th>4&quot; Bore (101.60)</th>
<th>5&quot; Bore (127.00)</th>
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</thead>
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<tr>
<td>eB Bushing</td>
<td>eB Bushing</td>
<td>eB Bushing</td>
<td>eB Bushing</td>
<td>eB Bushing</td>
<td>eB Bushing</td>
<td>eB Bushing</td>
</tr>
<tr>
<td>eMM</td>
<td>eMM</td>
<td>eMM</td>
<td>eMM</td>
<td>eMM</td>
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#### Type 6 Solid (Full Thread Male Optional)

<table>
<thead>
<tr>
<th>Dimension</th>
<th>2&quot; Bore (50.80)</th>
<th>2-1/2&quot; Bore (63.50)</th>
<th>3&quot; Bore (76.20)</th>
<th>4&quot; Bore (101.60)</th>
<th>5&quot; Bore (127.00)</th>
<th>6&quot; Bore (177.80)</th>
<th>8&quot; Bore (203.20)</th>
</tr>
</thead>
<tbody>
<tr>
<td>eB Bushing</td>
<td>eB Bushing</td>
<td>eB Bushing</td>
<td>eB Bushing</td>
<td>eB Bushing</td>
<td>eB Bushing</td>
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<td>eB Bushing</td>
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<tr>
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<td>eMM</td>
<td>eMM</td>
<td>eMM</td>
<td>eMM</td>
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</table>

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Norgren

Brookville, OH USA

Phone 937-833-4033

www.norgren.com

ACT-1-69
Series A & EA, NFPA Aluminum Air Cylinders (ø1-1/2 to 8")
Series J & EJ, NFPA Steel Air Cylinders (ø1-1/2 to 12")

- NFPA (MP3) 32 Cap Fixed Eye for 1-1/2" to 6" bore sizes.
- Series A & J Cylinders rated to 250 PSI air, 400 PSI hydraulic (non-shock).
  Series EA & EJ Cylinders rated to 250 PSI air only.
- Designed for non-lube service.
- Switches available on all bore sizes. (See pages ACT-1-90 & 91 for ordering information.)

Cylinder with 32 (MP3) Cap Fixed Eye

Cylinder Order Information

<table>
<thead>
<tr>
<th>Bore and Stroke (Write Out)</th>
</tr>
</thead>
</table>

<table>
<thead>
<tr>
<th>Mounting Options</th>
</tr>
</thead>
<tbody>
<tr>
<td>01 Side Tapped (MS4)</td>
</tr>
<tr>
<td>03 Head Rectangular Range (MF1)</td>
</tr>
<tr>
<td>04 Cap Rectangular Range (MF2)</td>
</tr>
<tr>
<td>05 Basic Cylinder No Mounting (MX0)</td>
</tr>
<tr>
<td>06 Both Ends (4) Tie Rods Ext. (MX1)</td>
</tr>
<tr>
<td>08 Both Ends (2) Tie Rods Ext. (MX4)</td>
</tr>
<tr>
<td>6C Cap Tie Rods Ext. (MX6)</td>
</tr>
<tr>
<td>0M Head Tie Rods Ext. (MXS)</td>
</tr>
<tr>
<td>07 Head Trunnion (MT1) - A &amp; EA</td>
</tr>
<tr>
<td>08 Cap Trunnion (MT2) - J &amp; EJ</td>
</tr>
<tr>
<td>09 Side Lugs (MSL)</td>
</tr>
<tr>
<td>10 Center Trunnion (MT4)</td>
</tr>
<tr>
<td>12 Cap Fixed Clevis (MP1)</td>
</tr>
<tr>
<td>15 Side End Lugs (MS2)</td>
</tr>
<tr>
<td>16 Sleeve Nut Construction (Universal)</td>
</tr>
<tr>
<td>20 Head Square Range (MF5)</td>
</tr>
<tr>
<td>21 Cap Square Range (MF6)</td>
</tr>
<tr>
<td>22 Detachable Cap Clevis (MP2)</td>
</tr>
<tr>
<td>32 Cap Fixed Eye (MP3)</td>
</tr>
<tr>
<td>42 Detachable Cap Eye (MP4)</td>
</tr>
<tr>
<td>52 Spherical Bearing</td>
</tr>
<tr>
<td>60 Base Bar (Not NFPA - A &amp; EA Only)</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Cushion in Head</th>
</tr>
</thead>
<tbody>
<tr>
<td>3 None</td>
</tr>
<tr>
<td>5* Non-Adjustable Cushion</td>
</tr>
<tr>
<td>7 Adjustable Cushion (Position 2)</td>
</tr>
<tr>
<td>9 Decal Cushion</td>
</tr>
</tbody>
</table>

*Standard with EA & EJ

<table>
<thead>
<tr>
<th>Cushion in Cap</th>
</tr>
</thead>
<tbody>
<tr>
<td>3 None</td>
</tr>
<tr>
<td>5* Non-Adjustable Cushion</td>
</tr>
<tr>
<td>7 Adjustable Cushion (Position 2)</td>
</tr>
<tr>
<td>9 Decal Cushion</td>
</tr>
</tbody>
</table>

*Standard with EA & EJ

See page ACT-1-96 for complete instructions on how to order cylinders.

Additional Options – order alphabetically – More on page ACT-1-95

- HR Case Hardened (45 Rc)
- L(_) Port Location position 1 standard: L(Head Cap)
  (Specify position 1 thru 4 for head and/or cap)
- MS Metal Rod Scraper
- N(_) Cushion Adjust Screw Location position 2 standard: N(Head Cap)
  (Specify position 1 thru 4 for head and/or cap)
- P(,) Non-Standard Port Size; (Specify port size for P(,) head only; P(,) cap only, or P(,) both head & cap)
- PS Magnetic Piston – includes aluminum tube option for J & EJ - Std. for Alum
- RS Rod Stud
  Type 1 (5/8" - 1 1/4" ø Rod)
  Type 2 (5/8" & 1" ø Rod)
- RX Rod Extensions (Specify length of additional rod extension)
  SC Single Acting Spring Extend (Cap End) – See page ACT-1-86
  SR Single Acting Spring Retract (Rod End) – See page ACT-1-86
- SS 303 Stainless Steel (Hard Chrome Plated)
- ST(_) Stop Tube (Cap End) (Specify stop tube length)
- ST(,) Stop Tube (Rod End) (Specify stop tube length)
- T Special Rod Threads (Specify rod thread)
- TX Thread Extensions (Specify length of thread extension)
- W Viton® Seals

1 1/2", 2", 2 1/2" bore cylinders have 3/8" NPT Standard, 1/2" NPT oversize.
3 1/4", 4", 5" bore cylinders have 1/2" NPT Standard, 3/4" NPT oversize.
This will add 1/8" to the overall cylinder length.

<table>
<thead>
<tr>
<th>Piston Rod Threads Type</th>
</tr>
</thead>
<tbody>
<tr>
<td>1 Small Male (Solid)</td>
</tr>
<tr>
<td>2 Intermediate Thread Male (Solid)</td>
</tr>
<tr>
<td>3 Female</td>
</tr>
<tr>
<td>6 Full Thread Male (Solid)</td>
</tr>
<tr>
<td>7 Plain Rod End</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Piston Rod Diameters</th>
</tr>
</thead>
<tbody>
<tr>
<td>A* 5/8&quot;  Standard on 1 1/2&quot;, 2&quot;, 2 1/2&quot;</td>
</tr>
<tr>
<td>B** 1&quot;  Standard on 3 1/4&quot;, 4&quot;, 5&quot;</td>
</tr>
<tr>
<td>C** 1 1/4&quot;  Standard on 6&quot;, 7&quot;, 8&quot;</td>
</tr>
<tr>
<td>D** 1 3/4&quot;  Oversized on 6&quot;, 7&quot;, 8&quot;</td>
</tr>
<tr>
<td>E 2&quot;  Standard on 10&quot;</td>
</tr>
<tr>
<td>F 2 1/2&quot;  Oversized on 10&quot;, 12&quot;</td>
</tr>
</tbody>
</table>

* A & EA uses A-Only.

Port and Cushion Adjustment
Positions (As viewed from rod end: Port standard position 1, Cushion Adjustment standard position 2.)

NOTE: A Port and a Cushion Adjustment cannot be in the same position.
### Standard & Optional Rod Ends

**Type 1 Solid**
- Bore (Small Male)

<table>
<thead>
<tr>
<th>Dimension</th>
<th>1 1/2&quot; Bore (38.10)</th>
<th>2&quot; Bore (50.80)</th>
<th>2 1/2&quot; Bore (63.50)</th>
<th>3 1/4&quot; Bore (82.55)</th>
<th>4&quot; Bore (101.60)</th>
<th>5&quot; Bore (127.00)</th>
<th>6&quot; Bore (152.40)</th>
</tr>
</thead>
<tbody>
<tr>
<td>øA Std.</td>
<td>5/8&quot; (15.88)</td>
<td>5/8&quot; (15.88)</td>
<td>5/8&quot; (15.88)</td>
<td>1&quot; (25.40)</td>
<td>1&quot; (25.40)</td>
<td>1&quot; (25.40)</td>
<td>1 1/4&quot; (34.93)</td>
</tr>
<tr>
<td>øA Comp.</td>
<td>5/8&quot; (15.88)</td>
<td>5/8&quot; (15.88)</td>
<td>5/8&quot; (15.88)</td>
<td>1&quot; (25.40)</td>
<td>1&quot; (25.40)</td>
<td>1&quot; (25.40)</td>
<td>1 1/4&quot; (34.93)</td>
</tr>
<tr>
<td>øB Std.</td>
<td>1 1/2&quot; (38.10)</td>
<td>1 1/2&quot; (38.10)</td>
<td>1 1/2&quot; (38.10)</td>
<td>1 3/8&quot; (34.93)</td>
<td>1 3/8&quot; (34.93)</td>
<td>1 3/8&quot; (34.93)</td>
<td>1 5/8&quot; (34.93)</td>
</tr>
<tr>
<td>øB Comp.</td>
<td>1 1/2&quot; (38.10)</td>
<td>1 1/2&quot; (38.10)</td>
<td>1 1/2&quot; (38.10)</td>
<td>1 3/8&quot; (34.93)</td>
<td>1 3/8&quot; (34.93)</td>
<td>1 3/8&quot; (34.93)</td>
<td>1 5/8&quot; (34.93)</td>
</tr>
<tr>
<td>øB Std.</td>
<td>2&quot; (50.80)</td>
<td>2&quot; (50.80)</td>
<td>2&quot; (50.80)</td>
<td>2&quot; (50.80)</td>
<td>2&quot; (50.80)</td>
<td>2&quot; (50.80)</td>
<td>2&quot; (50.80)</td>
</tr>
<tr>
<td>øB Comp.</td>
<td>2&quot; (50.80)</td>
<td>2&quot; (50.80)</td>
<td>2&quot; (50.80)</td>
<td>2&quot; (50.80)</td>
<td>2&quot; (50.80)</td>
<td>2&quot; (50.80)</td>
<td>2&quot; (50.80)</td>
</tr>
<tr>
<td>øB Std.</td>
<td>2 1/2&quot; (63.50)</td>
<td>2 1/2&quot; (63.50)</td>
<td>2 1/2&quot; (63.50)</td>
<td>2 1/2&quot; (63.50)</td>
<td>2 1/2&quot; (63.50)</td>
<td>2 1/2&quot; (63.50)</td>
<td>2 1/2&quot; (63.50)</td>
</tr>
<tr>
<td>øB Comp.</td>
<td>2 1/2&quot; (63.50)</td>
<td>2 1/2&quot; (63.50)</td>
<td>2 1/2&quot; (63.50)</td>
<td>2 1/2&quot; (63.50)</td>
<td>2 1/2&quot; (63.50)</td>
<td>2 1/2&quot; (63.50)</td>
<td>2 1/2&quot; (63.50)</td>
</tr>
<tr>
<td>øB Std.</td>
<td>3 1/4&quot; (82.55)</td>
<td>3 1/4&quot; (82.55)</td>
<td>3 1/4&quot; (82.55)</td>
<td>3 1/4&quot; (82.55)</td>
<td>3 1/4&quot; (82.55)</td>
<td>3 1/4&quot; (82.55)</td>
<td>3 1/4&quot; (82.55)</td>
</tr>
<tr>
<td>øB Comp.</td>
<td>3 1/4&quot; (82.55)</td>
<td>3 1/4&quot; (82.55)</td>
<td>3 1/4&quot; (82.55)</td>
<td>3 1/4&quot; (82.55)</td>
<td>3 1/4&quot; (82.55)</td>
<td>3 1/4&quot; (82.55)</td>
<td>3 1/4&quot; (82.55)</td>
</tr>
</tbody>
</table>

**Type 1 Studded**
- Bore (Studded Male Optional)

**Type 2 Studded**
- Intermediate Thread Male Optional

**Type 2 Solid**
- Intermediate Thread Male Optional

**Type 3 Female**
- Optional

**Type 6 Solid**
- Full Thread Male Optional
Series A & EJ, NFPA Steel Air Cylinders (ø1-1/2 to 12"

- NFPA (MP3) 32 Cap Fixed Eye for 7" to 12" bore sizes.
- Series A & J Cylinders rated to 250 PSI air, 400 PSI hydraulic (non-shock).
- Series EA & EJ Cylinders rated to 250 PSI air only.
- Designed for non-lube service.
- Switches available on all bore sizes.

(See pages ACT-1-90 & 91 for ordering information.)

Cylinder Order Information

Bore and Stroke (write out)

A Series A Cylinder
EA Series EA Cylinder
J Series J Cylinder
EJ Series EJ Cylinder

Mounting Options
01 Side Tapped (MS4)
03 Head Rectangular (MF1)
03 Head Square (MF2) - 7" to 12" Bores
04 Cap Rectangular (MF2)
04 Cap Square (MF3) - 7" to 12" Bores
05 Basic Cylinder No Mounting (M00)
06 Both Ends (4) Tie Rods Ext. (MX1)
06 Both Ends (2) Tie Rods Ext. (MX1)
06 Cap Tie Rods Ext. (M06)
09 Side Lugs (MS2)
10 Center Trunnion (MT4)
11 Side End Angles (MD1)
12 Cap Fixed Clevis (MP1)
15 Side End Lugs (MS7)
16 Sleeve Nut Construction (Universal)
20 Head Square Range (MF5)
21 Cap Square Range (MF6)
22 Detachable Cap Clevis (MP2)
32 Cap Fixed Eye (MP3)
42 Detachable Cap Eye (MP4)
52 Spherical Bearing
60 Base Bar (Not NFPA - A & EA Only)

Cushion in Head
3 None
5** Non-Adjustable Cushion
7 Adjustable Cushion (Position 2)
9 Decel Cushion
*Standard with EA & EJ

Cushion in Cap
3 None
5** Non-Adjustable Cushion
7 Adjustable Cushion (Position 2)
9 Decel Cushion
*Standard with EA & EJ

See page ACT-1-96 for complete instructions on how to order cylinders.
Series A & EA, NFPA Aluminum Air Cylinders (ø1-1/2 to 8")
Series J & EJ, NFPA Steel Air Cylinders (ø1-1/2 to 8")

- NFPA (MP4) 42 Detachable Cap Eye Mount for 1-1/2" to 8" bore sizes.
- Series A & J Cylinders rated to 250 PSI air, 400 PSI hydraulic (non-shock).
- Series EA & EJ Cylinders rated to 250 PSI air only.
- Designed for non-lube service.
- Switches available on all bore sizes.

(See pages ACT-1-90 & 91 for ordering information.)

Cylinder Order Information

Bore and Stroke (write out)

<table>
<thead>
<tr>
<th>Mounting Options</th>
</tr>
</thead>
<tbody>
<tr>
<td>01 Side Tapped (MS4)</td>
</tr>
<tr>
<td>03 Head Rectangular Range (MF1)</td>
</tr>
<tr>
<td>04 Cap Rectangular Range (MR2)</td>
</tr>
<tr>
<td>05 Basic Cylinder No Mounting (MX0)</td>
</tr>
<tr>
<td>06 Both Ends (4) Tie Rods Ext. (MX1)</td>
</tr>
<tr>
<td>07 Both Ends (2) Tie Rods Ext. (MX4)</td>
</tr>
<tr>
<td>09 Cap Tie Rods Ext. (MX2)</td>
</tr>
<tr>
<td>08 Head Tie Rods Ext. (MX3)</td>
</tr>
<tr>
<td>10 Center Trunnion (MT4)</td>
</tr>
<tr>
<td>11 Side End Angles (MS1)</td>
</tr>
<tr>
<td>12 Cap Fixed Clevis (MP1)</td>
</tr>
<tr>
<td>15 Side End Lugs (MS7)</td>
</tr>
<tr>
<td>16 Sleeve Nut Construction (Universal)</td>
</tr>
<tr>
<td>18 Tube Square Range (MF5)</td>
</tr>
<tr>
<td>19 Cap Square Range (MR6)</td>
</tr>
<tr>
<td>20 Detachable Cap Clevis (MP2)</td>
</tr>
<tr>
<td>22 Cap Fixed Eye (MP3)</td>
</tr>
<tr>
<td>42 Detachable Cap Eye (MP4)</td>
</tr>
<tr>
<td>52 Spherical Bearing</td>
</tr>
<tr>
<td>60 Base Bar (Not NFPA - A &amp; EA Only)</td>
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</table>

- Piston Rod Diameters

<table>
<thead>
<tr>
<th>Type</th>
<th>Diameter</th>
</tr>
</thead>
<tbody>
<tr>
<td>A**</td>
<td>1/4&quot;</td>
</tr>
<tr>
<td>B**</td>
<td>1&quot;</td>
</tr>
<tr>
<td>C**</td>
<td>1½&quot;</td>
</tr>
<tr>
<td>D**</td>
<td>1¾&quot;</td>
</tr>
<tr>
<td>E</td>
<td>2&quot;</td>
</tr>
<tr>
<td>F</td>
<td>2½&quot;</td>
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</tbody>
</table>

- Piston Rod Threads

<table>
<thead>
<tr>
<th>Type</th>
<th>Thread</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>S/Male</td>
</tr>
<tr>
<td>2</td>
<td>I/Male</td>
</tr>
<tr>
<td>3</td>
<td>Female</td>
</tr>
<tr>
<td>6</td>
<td>F/Male</td>
</tr>
<tr>
<td>7</td>
<td>Plain Rod</td>
</tr>
</tbody>
</table>

- Cylinder with 42 (MP4) Detachable Cap Eye

See page ACT-1-96 for complete instructions on how to order cylinders.
## Standard & Optional Rod Ends

### Type 1 Solid
- **A Std.**
- **ø Rod Std.**
- **Y Std.**
- **WF Std.**
- **VF Std.**
- **P**
- **MR**
- **MM Std.**

### Type 1 Studded
- **KK Std.**
  - 7/16 – 20
  - 3/4 – 16
  - 1 – 14

### Type 2 Studded
- **Intermediate Thread Male Option**
- **CC Thds.**

### Type 2 Solid
- **Intermediate Thread Male Option**

### Type 3 Female
- **MM ø**
- **Thds.**

### Type 6 Solid
- **Full Thread Male Option**

---

### Dimensions

**Dimension**
- 1 1/2" Bore (38.10)
- 2" Bore (50.80)
- 2 1/2" Bore (63.50)
- 3 1/4" Bore (82.55)
- 4" Bore (101.60)
- 5" Bore (127.00)
- 6" Bore (152.40)
- 7" Bore (177.80)
- 8" Bore (203.20)

**Options**
- Std.
- Optional Rod Ends

**Materials**
- Aluminum
- Steel

**Threading**
- Male
- Female

**Bushing**
- øB

**Flats**
- +.000

**Series**
- A & EA, NFPA Aluminum Air Cylinder with 42 (MP4) Detachable Cap Eye
- J & EJ, NFPA Steel Air Cylinder with 42 (MP4) Detachable Cap Eye

**All Dimensions in Inches (mm)**

---

**Notes:**
- Across Flats
- XD + Stroke
- E Sq.
- CB

---

**Brookville, OH USA Phone 937-833-4033 www.norgren.com**
**Series A & EA Aluminum Air Cylinders (ø1-1/2 to 8")**

**Series J & EJ Steel Air Cylinders (ø1-1/2 to 12")**

- **52 (Not NFPA) Spherical Bearing Mount** for 1-1/2" to 8" bore sizes.
- **Series A & J Cylinders** rated to 250 PSI air, 400 PSI hydraulic (non-shock).
  - Series EA & EJ Cylinders rated to 250 PSI air only.
- **Designed for non-lube service.**
- **Switches available on all bore sizes.** (See pages ACT-1-90 & 91 for ordering information.)

---

**Cylinder Order Information**

- **Bore and Stroke** (write out)

---

**Mounting Options**

- 01 Side Tapped (MS4)
- 03 Head Rectangular Flange (MF1)
- 03 Head Square (MS5) – 7" to 12" Bore
- 04 Cap Rectangular Flange (MF2)
- 04 Cap Square (MS6) – 7" to 12" Bore
- 05 Basic Cylinder No Mounting (MX0)
- 06 Both Ends (4) Tie Rods Ext. (MX1)
- 06 Both Ends (2) Tie Rods Ext. (MX4)
- 06 Cap Tie Rods Ext. (MX2)
- 6R Head Tie Rods Ext. (MX3)
- 07 Removable Head Trunnion (MT1) - A & EA
- 07 Head Trunnion (MT1) - J & EJ
- 08 Cap Trunnion (MT2) - A & EA
- 08 Cap Trunnion (MT2) - J & EJ
- 09 Side Lugs (MS2)
- 10 Center Trunnion (MT4)
- 11 Side End Angles (MS1)
- 12 Cap Fixed Clevis (MP1)
- 15 Side End Lugs (MS5)
- 16 Sleeve Nut Construction (Universal)
- 20 Head Square Range (MF5)
- 21 Cap Square Range (MF6)
- 22 Detachable Cap Clevis (MP2)
- 22 Cap Fixed Eye (MP3)
- 22 Detachable Cap Eye (MP4)
- 52 Spherical Bearing
- 60 Base Bar (Not NFPA - A & EA Only)

---

**Additional Options**

- **HR** Case Hardened (45 Rc)
- **L(____) Port Location** position 1 standard: L(Head Cap)
- **L(____) Port Location** position 4 for head and/or cap
- **MS** Metal Rod Scraper
- **N(____) Cushion Adjust Screw Location** position 2 standard: N(Head Cap)
- **P(____) Non-Standard Port Size** position 1 thru 4 for head and/or cap
- **P(____) Non-Standard Port Size** position 1 thru 4 for head and/or cap
- **PS** Magnetic Piston – includes aluminum tube option for J & EJ - Std. for Alum
- **RS** Rod Stud
  - Type 1 (5/8" – 1½" ø Rod)
  - Type 2 (5/8" & 1" ø Rod)
- **RX** Rod Extensions (specify length of additional rod extension)
- **SC** Single Acting Spring Extend (Cap End) – See page ACT-1-86
- **SR** Single Acting Spring Retract (Rod End) – See page ACT-1-86
- **SS** 303 Stainless Steel (Hard Chrome Plated)
- **ST(____) Stop Tube (Cap End)** position 1 standard: ST(Head Cap)
- **ST(____) Stop Tube (Cap End)** position 1 thru 4 for head and/or cap
- **TX** Thread Extensions (specify length of thread extension)
- **V** Viton® Seals

---

**Piston Rod Threads Type**

- 1 Small Male (Solid)
- 2 Intermediate Thread Male (Solid)
- 3 Female
- 6 Full Thread Male (Solid)
- 7 Plain Rod End

---

**Piston Rod Diameters**

- A **1½" Standard on 1½", 2", 2½" Over sized on 2½", 3½"**
- B **2" Standard on 2¾", 3", 3½" Over sized on 3½", 4", 5"**
- C **1¼" Standard on 1¾", 2", 2½" Over sized on 2½", 3"**
- D **1¾" Standard on 3", 3½", 4" Over sized on 4½", 5", 6"**
- E **2½" Standard on 3", 3½" Over sized on 4", 5"**
- F **2½" Standard on 4", 5" Over sized on 6", 7"**

---

**Port and Cushion Adjustment Positions** (As viewed from rod end)

- Port standard position 1, Cushion Adjustment standard position 2.
- **Note:** Port and a Cushion Adjustment cannot be in the same position.

---

See page ACT-1-96 for complete instructions on how to order cylinders.
Series A & EA Aluminum Air Cylinders (ø1-1/2 to 6")

- 60 Base (Not NFPA) Bar Mount for 1-1/2" to 6" bore sizes.
- Series A Cylinders rated to 250 PSI air, 400 PSI hydraulic (non-shock).
- Series EA Cylinders rated to 250 PSI air only.
- Designed for non-lube service.
- Switches available on all bore sizes.
  (See pages ACT-1-90 & 91 for ordering information.)

**Cylinder Order Information**

<table>
<thead>
<tr>
<th>Mounting Options</th>
<th>A</th>
<th>EA</th>
</tr>
</thead>
<tbody>
<tr>
<td>01 Side Tapped (MS4)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>03 Head Rectangular Range (MF1)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>03 Head Square (MS3) – 7&quot; &amp; 8&quot; Bores</td>
<td></td>
<td></td>
</tr>
<tr>
<td>04 Cap Rectangular Range (MP2)</td>
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</tr>
<tr>
<td>04 Cap Square (MS4) – 7&quot; &amp; 8&quot; Bores</td>
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<tr>
<td>05 Basic Cylinder No Mounting (MX0)</td>
<td></td>
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</tr>
<tr>
<td>06 Both Ends (4) Tie Rods Ext. (MX1)</td>
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</tr>
<tr>
<td>08B Both Ends (2) Tie Rods Ext. (MX4)</td>
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<tr>
<td>06 Cap Tie Rods Ext. (MX2)</td>
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</tr>
<tr>
<td>6R Head Tie Rods Ext. (MX3)</td>
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</tr>
<tr>
<td>7R Head Trunnion (MT1)</td>
<td></td>
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</tr>
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<td>8R Cap Trunnion (MT2)</td>
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<tr>
<td>09 Side Lugs (MS2)</td>
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<td>10 Center Trunnion (MT4)</td>
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<td>11 Side End Angles (MS1)</td>
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<tr>
<td>12 Cap Fixed Clevis (MP1)</td>
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<tr>
<td>15 Side End Lugs (MS7)</td>
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<tr>
<td>16 Sleeve Nut Construction (Universal)</td>
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<td></td>
</tr>
<tr>
<td>20 Head Square Range (MP5)</td>
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</tr>
<tr>
<td>21 Cap Square Range (MP6)</td>
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</tr>
<tr>
<td>22 Detachable Cap Clevis (MP2)</td>
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<tr>
<td>32 Cap Fixed Eye (MP3)</td>
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</tr>
<tr>
<td>42 Detachable Cap Eye (MP4)</td>
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<tr>
<td>52 Spherical Bearing</td>
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</tr>
<tr>
<td>60 Base Bar (Not NFPA)</td>
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<td></td>
</tr>
</tbody>
</table>

**Additional Options**

- HR Case Hardened (45 Rc)
- U(Head, Cap) Port Location position 1 standard: U(Head, Cap)
- MS Metal Rod Scraper
- NL Cushion Adjust Screw Location position 2 standard: N(Head, Cap)
- P( ) Non-Standard Port Sizes: (specify port size for P( _H) head only, P(_C) cap only, or P( _H)_C both head & cap)
- PS Magnetic Piston
- RS Rod Stud
- RX Rod Extensions (specify length of additional rod extension)
- SC Single Acting Spring Extend (Cap End) – See page ACT-1-86
- SR Single Acting Spring Retract (Rod End) – See page ACT-1-86
- SS 303 Stainless Steel (Hard Chrome Plated)
- STL.C Stop Tube (Cap End) (specify stop tube length)
- STL.R Stop Tube (Rod End) (specify stop tube length)
- T Special Rod Threads (specify rod thread)
- TX Thread Extensions (specify length of thread extension)
- V Viton® Seals

1 1/2", 2", 2 1/2" bore cylinders have 3/8" NPT Standard, 1/2" NPT oversize. 3 1/4", 4", 5" bore cylinders have 1/2" NPT Standard, 3/4" NPT oversize. This will add 1/8" to the overall cylinder length.

**Motion Rod Threads Type**

<table>
<thead>
<tr>
<th>1</th>
<th>Small Male (Solid)</th>
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<tbody>
<tr>
<td>2</td>
<td>Intermediate Thread Male (Solid)</td>
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<tr>
<td>3</td>
<td>Female</td>
</tr>
<tr>
<td>6</td>
<td>Full Thread Male (Solid)</td>
</tr>
<tr>
<td>7</td>
<td>Plain Rod End</td>
</tr>
</tbody>
</table>

**Motion Rod Diameters**

<table>
<thead>
<tr>
<th>A (1/2&quot;) Standard on 1 1/2&quot;, 2&quot;, 2 1/2&quot;</th>
<th>B (1&quot;) Standard on 3 1/4&quot;, 4&quot;, 5&quot;</th>
</tr>
</thead>
<tbody>
<tr>
<td>Oversized on 1 1/2&quot;, 2&quot;, 2 1/2&quot;</td>
<td>Oversized on 3 1/4&quot;, 4&quot;, 5&quot;</td>
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</tbody>
</table>

**Port and Cushion Adjustment Positions**

<table>
<thead>
<tr>
<th>1</th>
<th>Small Male (Solid)</th>
</tr>
</thead>
<tbody>
<tr>
<td>2</td>
<td>Intermediate Thread Male (Solid)</td>
</tr>
<tr>
<td>3</td>
<td>Female</td>
</tr>
<tr>
<td>6</td>
<td>Full Thread Male (Solid)</td>
</tr>
<tr>
<td>7</td>
<td>Plain Rod End</td>
</tr>
</tbody>
</table>

NOTE: A Port and a Cushion Adjustment cannot be in the same position.

See page ACT-1-96 for complete instructions on how to order cylinders.
### Standard & Optional Rod Ends

#### Type 1 Solid
- **Series A, NFPA Aluminum Air Cylinders with 60 (Not NFPA) Base Bar**
- All Dimensions in Inches (mm)

#### Type 1 Studded (Stud Male Optional)

#### Type 2 Studded (Intermediate Thread Male Optional)

#### Type 2 Solid (Intermediate Thread Male Optional)

#### Type 3 Female (Optional)

#### Type 6 Solid (Full Thread Male Optional)

<table>
<thead>
<tr>
<th>Dimension</th>
<th>1 1/2&quot; Bore (38.10)</th>
<th>2&quot; Bore (50.80)</th>
<th>2 1/4&quot; Bore (63.50)</th>
<th>3 1/4&quot; Bore (82.55)</th>
<th>4&quot; Bore (101.60)</th>
<th>5&quot; Bore (127.00)</th>
<th>6&quot; Bore (152.40)</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>A</strong></td>
<td>5/8&quot; (15.88)</td>
<td>5/8&quot; (15.88)</td>
<td>1&quot; (25.40)</td>
<td>1&quot; (25.40)</td>
<td>1 1/4&quot; (31.75)</td>
<td>1 1/2&quot; (38.10)</td>
<td>1 1/4&quot; (31.75)</td>
</tr>
<tr>
<td><strong>B</strong></td>
<td>7/16&quot; (11.11)</td>
<td>7/16&quot; (11.11)</td>
<td>7/32&quot; (9.53)</td>
<td>7/32&quot; (9.53)</td>
<td>7/32&quot; (9.53)</td>
<td>7/32&quot; (9.53)</td>
<td>7/32&quot; (9.53)</td>
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<tr>
<td><strong>C</strong></td>
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<td>5/32&quot; (1.59)</td>
<td>5/32&quot; (1.59)</td>
<td>5/32&quot; (1.59)</td>
<td>5/32&quot; (1.59)</td>
<td>5/32&quot; (1.59)</td>
<td>5/32&quot; (1.59)</td>
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<tr>
<td><strong>D</strong></td>
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<td>3/32&quot; (0.95)</td>
<td>3/32&quot; (0.95)</td>
<td>3/32&quot; (0.95)</td>
<td>3/32&quot; (0.95)</td>
<td>3/32&quot; (0.95)</td>
<td>3/32&quot; (0.95)</td>
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<tr>
<td><strong>E</strong></td>
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<td>7/64&quot; (0.44)</td>
<td>7/64&quot; (0.44)</td>
<td>7/64&quot; (0.44)</td>
<td>7/64&quot; (0.44)</td>
<td>7/64&quot; (0.44)</td>
<td>7/64&quot; (0.44)</td>
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</tbody>
</table>

#### Optional Rod Ends

#### Type 1 Solid
- **Series A, NFPA Aluminum Air Cylinders with 60 (Not NFPA) Base Bar**
- All Dimensions in Inches (mm)

#### Type 1 Studded (Stud Male Optional)

#### Type 2 Studded (Intermediate Thread Male Optional)

#### Type 2 Solid (Intermediate Thread Male Optional)

#### Type 3 Female (Optional)

#### Type 6 Solid (Full Thread Male Optional)

<table>
<thead>
<tr>
<th>Dimension</th>
<th>1 1/2&quot; Bore (38.10)</th>
<th>2&quot; Bore (50.80)</th>
<th>2 1/4&quot; Bore (63.50)</th>
<th>3 1/4&quot; Bore (82.55)</th>
<th>4&quot; Bore (101.60)</th>
<th>5&quot; Bore (127.00)</th>
<th>6&quot; Bore (152.40)</th>
</tr>
</thead>
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<tr>
<td><strong>A</strong></td>
<td>5/8&quot; (15.88)</td>
<td>5/8&quot; (15.88)</td>
<td>1&quot; (25.40)</td>
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<td>1 1/4&quot; (31.75)</td>
<td>1 1/2&quot; (38.10)</td>
<td>1 1/4&quot; (31.75)</td>
</tr>
<tr>
<td><strong>B</strong></td>
<td>7/16&quot; (11.11)</td>
<td>7/16&quot; (11.11)</td>
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<td>7/32&quot; (9.53)</td>
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<td>7/32&quot; (9.53)</td>
<td>7/32&quot; (9.53)</td>
</tr>
<tr>
<td><strong>C</strong></td>
<td>5/32&quot; (1.59)</td>
<td>5/32&quot; (1.59)</td>
<td>5/32&quot; (1.59)</td>
<td>5/32&quot; (1.59)</td>
<td>5/32&quot; (1.59)</td>
<td>5/32&quot; (1.59)</td>
<td>5/32&quot; (1.59)</td>
</tr>
<tr>
<td><strong>D</strong></td>
<td>3/32&quot; (0.95)</td>
<td>3/32&quot; (0.95)</td>
<td>3/32&quot; (0.95)</td>
<td>3/32&quot; (0.95)</td>
<td>3/32&quot; (0.95)</td>
<td>3/32&quot; (0.95)</td>
<td>3/32&quot; (0.95)</td>
</tr>
<tr>
<td><strong>E</strong></td>
<td>7/64&quot; (0.44)</td>
<td>7/64&quot; (0.44)</td>
<td>7/64&quot; (0.44)</td>
<td>7/64&quot; (0.44)</td>
<td>7/64&quot; (0.44)</td>
<td>7/64&quot; (0.44)</td>
<td>7/64&quot; (0.44)</td>
</tr>
</tbody>
</table>

#### Optional Rod Ends

#### Type 1 Solid
- **Series A, NFPA Aluminum Air Cylinders with 60 (Not NFPA) Base Bar**
- All Dimensions in Inches (mm)

#### Type 1 Studded (Stud Male Optional)

#### Type 2 Studded (Intermediate Thread Male Optional)

#### Type 2 Solid (Intermediate Thread Male Optional)

#### Type 3 Female (Optional)

#### Type 6 Solid (Full Thread Male Optional)

<table>
<thead>
<tr>
<th>Dimension</th>
<th>1 1/2&quot; Bore (38.10)</th>
<th>2&quot; Bore (50.80)</th>
<th>2 1/4&quot; Bore (63.50)</th>
<th>3 1/4&quot; Bore (82.55)</th>
<th>4&quot; Bore (101.60)</th>
<th>5&quot; Bore (127.00)</th>
<th>6&quot; Bore (152.40)</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>A</strong></td>
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<td>5/8&quot; (15.88)</td>
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<td>1&quot; (25.40)</td>
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<td>1 1/2&quot; (38.10)</td>
<td>1 1/4&quot; (31.75)</td>
</tr>
<tr>
<td><strong>B</strong></td>
<td>7/16&quot; (11.11)</td>
<td>7/16&quot; (11.11)</td>
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<td>7/32&quot; (9.53)</td>
<td>7/32&quot; (9.53)</td>
<td>7/32&quot; (9.53)</td>
<td>7/32&quot; (9.53)</td>
</tr>
<tr>
<td><strong>C</strong></td>
<td>5/32&quot; (1.59)</td>
<td>5/32&quot; (1.59)</td>
<td>5/32&quot; (1.59)</td>
<td>5/32&quot; (1.59)</td>
<td>5/32&quot; (1.59)</td>
<td>5/32&quot; (1.59)</td>
<td>5/32&quot; (1.59)</td>
</tr>
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<td><strong>D</strong></td>
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</table>
Series DA & EDA NFPA Aluminum Air Cylinders (ø1-1/2 to 8"
Series DJ & EDJ, NFPA Steel Air Cylinders (ø1-1/2 to 12"

- NFPA (MX0) 05 Basic with Double Rod End Cylinder for 1-1/2" to 6" bore sizes.
- Series DA & EDA Cylinders rated to 250 PSI air, 400 PSI hydraulic (non-shock).
  Series EDA Cylinders rated to 250 PSI air only.
- Designed for non-lube service.
- Switches available on all bore sizes.
  (See pages ACT-1-90 & 91 for ordering information.)

Double Rod End Cylinder with 05 (MX0) Basic

Cylinder Order Information

05 - - - -

Bore and Stroke (write out)

Additional Options – order alphabetically – More on page ACT-1-95.
HR Case Hardened (45 Rc)
L(--) Port Location position 1 standard: L(Head Cap)
  (specify position 1 thru 4 for head and/or cap)
MS Metal Rod Scraper
N(--) Cushion Adjust Screw Location position 2 standard: N(Head Cap)
  (specify position 1 thru 4 for head and/or cap)
P(--) Non-Standard Port Sizes: (specify port size for P( _H) head only, P(_C) cap only, or P(_ ) both head & cap)
PS Magnetic Piston
RS Rod Stud
  Type 1 (5/8" – 1 3/4" ø Rod)
  Type 2 (5/8" & 1" ø Rod)
RX Rod Extensions (specify length of additional rod extension)
SC Single Acting Spring Extend (Cap End)–See page ACT-1-86
SR Single Acting Spring Retract (Rod End)–See page ACT-1-86
SS 303 Stainless Steel (Hard Chrome Plated)
ST(_C) Stop Tube (Cap End) (specify stop tube length)
ST(_R) Stop Tube (Rod End) (specify stop tube length)
T Special Rod Threads (specify rod thread)
TX Thread Extensions (specify length of thread extension)
V Viton® Seals

Mounting Options
01 Side Tapped (MS4)
03 Head Rectangular Flange (MF1)
03 Head Square (ME3) – 7" & 8" Bore
05 Basic Cylinder No Mounting (MX0)
06 Both Ends (4) Tie Rods Ext. (MX1)
68 Both Ends (2) Tie Rods Ext. (MX4)
6R Head Tie Rods Ext. (MX3)
7R Head Trunnion (MT1)
08 Side Lugs (MS8)
10 Center Trunnion (MT4)
11 Side End Angles (MS1)
15 Side End Lugs (MS7)
16 Sleeve Nut Construction (Universal)
20 Head Square Range (MF5)
60 Base Bar (Not NFPA) - A & EA Only

Piston Rod Diameters
A** 5/8" Standard on 1 1/2", 2", 2 1/2"
B** 1" Standard on 3 1/4", 4", 5"
C** 1 1/4" Standard on 6", 7", 8"
D** 1 1/2" Oversized on 6", 7", 8"
E 2" Standard on 12"
F 2 1/2" Oversized on 10", 12"

Cushion in Head
3 None
5* Non-Adjustable Cushion
7 Adjustable Cushion (Position 2)
9 Decal Cushion

Cushion in Cap
3 None
5* Non-Adjustable Cushion
7 Adjustable Cushion (Position 2)
9 Decal Cushion

NOTE: Double Rod End cylinders have a (Head Rod End) and the opposite end cap is considered the (Cap Rod End).

See page ACT-1-96 for complete instructions on how to order cylinders.
### Standard & Optional Rod Ends

**Series DA & EDA, NFPA Aluminum Double Rod End Air Cylinder with 05 (MX0) Basic**

**Series DJ & EDJ, NFPA Steel Double Rod End Air Cylinder with 05 (MX0) Basic**

**All Dimensions in Inches (mm)**

---

#### Dimension 1 1/2" Bore (38.10) 2" Bore (50.80) 2 1/2" Bore (63.50) 3 1/4" Bore (82.55) 4" Bore (101.60) 5" Bore (127.00) 6" Bore (152.40) 7" Bore (177.80) 8" Bore (203.20)

<table>
<thead>
<tr>
<th>Dimension</th>
<th>1 1/2&quot; Bore</th>
<th>2&quot; Bore</th>
<th>2 1/2&quot; Bore</th>
<th>3 1/4&quot; Bore</th>
<th>4&quot; Bore</th>
<th>5&quot; Bore</th>
<th>6&quot; Bore</th>
<th>7&quot; Bore</th>
<th>8&quot; Bore</th>
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<tr>
<td>1/2&quot; Female</td>
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<td>0.002</td>
<td>0.002</td>
<td>0.002</td>
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<td>0.002</td>
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<tr>
<td>1/2&quot; Female (Optional)</td>
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<td>0.002</td>
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</tbody>
</table>

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#### ACT-1-81
### Series DA & EDA, NFPA Aluminum Air Cylinders (ø1-1/2 to 8")
### Series DJ & EDJ, NFPA Steel Air Cylinders (ø1-1/2 to 12")

- **NFPA (MX0) 05 Basic with Double Rod End Cylinder** available in 7" thru 12" bore sizes.
- **Series DJ & EDJ** Cylinders rated to 250 PSI air, 400 PSI hydraulic (non-shock).
  - Series EDJ Cylinders rated to 250 PSI air only.
- Designed for non-lube service.
- Switches available on all bore sizes. (See pages ACT-1-90 & 91 for ordering information.)

#### Double Rod End Cylinder with 05 (MX0) Basic

#### Cylinder Order Information

**05 - - - -**

**Bore and Stroke (write out)**

**Additional Options** - order alphabetically – More on page ACT-1-95

- **HR** Case Hardened (45 Rc)
- **L(--)** Port Location position 1 standard: L(Head) Cap
  - (specify position 1 thru 4 for head and/or cap)
- **MS** Metal Rod Scraper
- **NL(--)** Cushion Adjust Screw Location position 2 standard: N(Head)
  - (specify position 1 thru 4 for head and/or cap)
- **PL(--)** Non-Standard Port Sizes: (specify port size for Pl( _H) head only, Pl(_C) cap only, or Pl( _H) both head & cap)
- **PS** Magnetic Piston – includes aluminum tube option
- **RS** Rod Stud
  - Type 1 (5/8” – 1 3/4” ø Rod)
  - Type 2 (5/8” & 1” ø Rod)
- **TX** Rod Extensions (specify length of additional rod extension)
- **SC** Single Acting Spring Extend (Cap End) – See page ACT-1-86
- **SR** Single Acting Spring Retract (Rod End) – See page ACT-1-86
- **ST(--)** Stop Tube (Cap) – See page ACT-1-86
- **ST(--)** Stop Tube (Rod End) – See page ACT-1-86
- **V** Viton® Seals

### Piston Rod Threads Type

- **1** Small Male (Solid)
- **2** Intermediate Thread Male (Solid)
- **3** Female
- **6** Full Thread Male (Solid)
- **7** Plain Rod End

### Piston Rod Diameters

<table>
<thead>
<tr>
<th>Diameter</th>
<th>Type</th>
</tr>
</thead>
<tbody>
<tr>
<td>ø1 1/2&quot;</td>
<td>Standard</td>
</tr>
<tr>
<td>ø2 1/4&quot;</td>
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<tr>
<td>ø2 1/2&quot;</td>
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<tr>
<td>ø3 1/4&quot;</td>
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<td>ø6 1/4&quot;</td>
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<td>ø7 1/4&quot;</td>
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</table>

### Mounting Options

<table>
<thead>
<tr>
<th>Mounting Options</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>01</td>
<td>Side Tapped (MS4)</td>
</tr>
<tr>
<td>03</td>
<td>Head Rectangular Range (MP1)</td>
</tr>
<tr>
<td>05</td>
<td>Head Square (M5) – 7 to 12” bores</td>
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<tr>
<td>06</td>
<td>Basic Cylinder No Mounting (MX0)</td>
</tr>
<tr>
<td>07</td>
<td>Head Trunnion (MT1)</td>
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<tr>
<td>09</td>
<td>Side Lugs (MS2)</td>
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<tr>
<td>10</td>
<td>Center Trunnion (MT4)</td>
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<tr>
<td>11</td>
<td>Side End Angles (MS1)</td>
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<td>15</td>
<td>Side End Lugs (MS7)</td>
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<td>16</td>
<td>Sleeve Nut Construction (Universal)</td>
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<tr>
<td>20</td>
<td>Head Square Range (MR5)</td>
</tr>
<tr>
<td>22</td>
<td>Base Bar (Not NFPA - A &amp; EA Only)</td>
</tr>
</tbody>
</table>

### Cushion in Head

- **3** None
- **5** Non-Adjustable Cushion
- **7** Adjustable Cushion (Position 2)
- **9** Decel Cushion

### Cushion in Cap

- **3** None
- **5** Non-Adjustable Cushion
- **7** Adjustable Cushion (Position 2)
- **9** Decel Cushion

**NOTE:** Double Rod End cylinders have a (Head Rod End) and the opposite end cap is considered the (Cap Rod End).

See page ACT-1-96 for complete instructions on how to order cylinders.
<table>
<thead>
<tr>
<th>Dimension</th>
<th>7&quot; Bore (177.80)</th>
<th>8&quot; Bore (203.20)</th>
<th>10&quot; Bore (254.00)</th>
<th>12&quot; Bore (304.80)</th>
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<td>Std. 1 ½&quot; (34.93)</td>
<td>1 ½&quot; (34.93)</td>
<td>1 ¾&quot; (44.45)</td>
<td>2&quot; (50.80)</td>
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<td>O.S. 1 ¼&quot; (34.93)</td>
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<td>1 ¾&quot; (44.45)</td>
<td>2&quot; (50.80)</td>
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<td></td>
<td>2&quot; (50.80)</td>
<td>2 ½&quot; (63.50)</td>
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<tr>
<td>øVf</td>
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<td>8.125</td>
<td>11.25</td>
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</tbody>
</table>
**NFPA Eye Bracket**

Note: NFPA Eye Bracket Assembly is supplied with Standard Pin.

**Norgren Eye Bracket**

Note: Norgren Eye Bracket Assembly is supplied with Standard Pin.

**NFPA Clevis Bracket**

Note: NFPA Clevis Bracket Assembly is supplied with Standard Pin.

**Norgren Clevis Bracket**

Note: Norgren Clevis Bracket Assembly is supplied with Standard Pin.

**NFPA Pin**

Note: a500, 750, 1,000 are Retainer type design of 375 and larger are Cotter Pin design.

**Standard Pin**

* For small rod clevis only, see page ACT-1-84.
Series A & EA Aluminum Optional Features & Custom Cylinders
Series J & EJ Steel Optional Features & Custom Cylinders
All Dimensions in Inches (mm)

Adjustable Stroke
Provides variable reduction of the retract stroke and serves as a positive stop for the cylinder piston. Consists of a threaded stud located in the cap end of the cylinder. Milled wrench flats on the end of the adjustment stud allow for simple yet precise positioning to accommodate varying retract stroke requirements.

TO ORDER: Enter option code A(_). Specify adjustable stroke length.

Adjustable Stroke with Piston
Provides variable reduction of the retract stroke and serves as a positive stop for the cylinder piston. Consists of an adjustable stop piston attached to a threaded stud located in the cap end of the cylinder. Milled wrench flats on the end of the adjustment stud allow for simple yet precise positioning of the stop piston to accommodate varying retract stroke requirements.

TO ORDER: Enter option code AA(_). Specify adjustable stroke length.

Maximum Adjustable Stroke Length

<table>
<thead>
<tr>
<th>Bore</th>
<th>11/2&quot; (38.10)</th>
<th>2&quot; (50.80)</th>
<th>21/2&quot; (63.50)</th>
<th>31/4&quot; (82.55)</th>
<th>4&quot; (101.60)</th>
<th>5&quot; (127.00)</th>
<th>6&quot; (152.40)</th>
<th>7&quot; (177.80)</th>
<th>8&quot; (203.20)</th>
</tr>
</thead>
<tbody>
<tr>
<td>K min.</td>
<td>1 (25.40)</td>
<td>1 (25.40)</td>
<td>1.375 (34.93)</td>
<td>1.375 (34.93)</td>
<td>1.375 (34.93)</td>
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<td>1.625 (41.28)</td>
<td>2 (50.80)</td>
<td>2 (50.80)</td>
</tr>
<tr>
<td>A (L max.)</td>
<td>5 (127.00)</td>
<td>5 (127.00)</td>
<td>8 (203.20)</td>
<td>8 (203.20)</td>
<td>8 (203.20)</td>
<td>9 (228.60)</td>
<td>9 (228.60)</td>
<td>12 (304.80)</td>
<td>12 (304.80)</td>
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<tr>
<td>AA (L max.)</td>
<td>10 (254.00)</td>
<td>10 (254.00)</td>
<td>16 (406.40)</td>
<td>16 (406.40)</td>
<td>16 (406.40)</td>
<td>16 (406.40)</td>
<td>16 (406.40)</td>
<td>16 (406.40)</td>
<td>20 (508.00)</td>
</tr>
</tbody>
</table>

Metallic Rod Scraper
Aggressively scrubs the exposed portion of the piston rod free of weld spatter, paint spray, abrasive powders or many other foreign materials that could damage the rod seal.

TO ORDER: Enter option code MS.

Piston Rod Stud
Reduces the chance for piston rod failure. The rod stud can be installed with different thread locker. TO ORDER, enter:
Option code BL – removable adhesive sealant.
Option code RS – high strength thread locker adhesive.
NOTE: Type 2 studded rod shown.

Pinned Piston to Rod
Norgren will supply a full size piston rod to piston joint, in addition to pinning the piston to the rod, for severe applications. If under normal operating conditions, the pinned piston and rod become detached, Norgren will replace the piston and rod assembly free of charge.

TO ORDER: Enter option code PN.

Single Acting Spring Extend
Available on Cap End of Cylinder for 11/2", 2", and 21/2" bore sizes, 12" maximum stroke.
NOTE: Standard spring extend cylinder has 12 lbs. force pre-load, 30 lbs. force compressed. For other spring forces, bore sizes or longer strokes, consult factory.
TO ORDER: Enter option code SC.

Single Acting Spring Retract
Available on Rod End of Cylinder for 11/2", 2", and 21/2" bore sizes, 12" maximum stroke.
NOTE: Standard spring retract cylinder has 12 lbs. force pre-load, 30 lbs. force compressed. For other spring forces, bore sizes or longer strokes, consult factory.
TO ORDER: Enter option code SR.
Note: Standard on A & J. Consult factory for EA & EJ.

Additional Female Thread Depth
Piston rod thread depth can be ordered over standard.
TO ORDER: Enter option code TF(_), and specify additional "A" depth.

Additional Male Thread Length
Piston rod thread extension can be ordered over standard.
TO ORDER: Enter option code TX(_, and specify additional "A" length.

Piston Rod Seal
O-Ring Loaded (A & J Only)
Pre-loaded lip seal has a very low leakage at low pressure. Excellent for low pressure hydraulic applications. TO ORDER, enter:
Option code H – Rod seal only.
Option code PP – Rod and piston seals.

Cushion Adjust Screw
Optional Locations
Option code N(_)
Specify Optional location.
Example: N(42) cushion location 4 Head end, standard position 2 Cap end.
When using option code N, head and cap locations must be specified 1, 2, 3, or 4.

Magnetic Piston
(No Wear Ring)
When position sensing of the cylinder rod is required, a "magnetic piston" must be specified. A magnetic band is placed at the center of the piston which creates a magnetic field to actuate Norgren's reed, solid state or hall effect switch.
NOTE: We cannot guarantee the operation of other manufacturers' switches.
TO ORDER: Enter option code PS.

Additional Male Thread Length
Piston rod thread extension can be ordered over standard.
TO ORDER: Enter option code TX(_, and specify additional "A" length.
Stop Tube
Enhances the transverse load carrying capability of a long stroke cylinder by increasing the distance between the piston and rod bearing at full extension when placed on head end. Ideal for those applications requiring longer strokes or where additional rod stability is desired.

TO ORDER: Enter option code ST(C) Cap End or ST(R) Rod End. Specify stop tube length.
NOTE: ST(R) Alternate design: the stop tube rod end design changes when the stop tube exceeds J lengths in the chart.

<table>
<thead>
<tr>
<th>Bore</th>
<th>1 1/2&quot; (38.10)</th>
<th>2&quot; (50.80)</th>
<th>2 1/2&quot; (63.50)</th>
<th>3 1/4&quot; (82.55)</th>
<th>4&quot; (101.60)</th>
<th>5&quot; (127.00)</th>
<th>6&quot; (152.40)</th>
<th>7&quot; (177.80)</th>
<th>8&quot; (203.20)</th>
</tr>
</thead>
<tbody>
<tr>
<td>J</td>
<td>1 (25.40)</td>
<td>1 (25.40)</td>
<td>1 (25.40)</td>
<td>1.250 (31.75)</td>
<td>1.250 (31.75)</td>
<td>1.250 (31.75)</td>
<td>1.500 (38.10)</td>
<td>1.500 (38.10)</td>
<td>1.500 (38.10)</td>
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</tbody>
</table>

Norgren's Standard
Thrust Key Plate
Thrust key plates eliminate the use of fitted bolts or dowel pins on side mountings. They prevent movement of the cylinder under shock loading, which might otherwise occur due to normal clearance between mounting holes and bolt diameters.
Option code TK available on 01(MS4), 09(MS2) and 15(MS7) mounts.
NOTE: Other manufacturers' thrust key plates can vary. Consult factory for information.

<table>
<thead>
<tr>
<th>Bore</th>
<th>E</th>
<th>F</th>
<th>FA</th>
<th>LN</th>
<th>PD</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>2.000 (50.80)</td>
<td>.375 (9.53)</td>
<td>.313 (7.93)</td>
<td>1.000 (25.40)</td>
<td>1.188 (30.18)</td>
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<td>2.500 (63.50)</td>
<td>.375 (9.53)</td>
<td>.313 (7.93)</td>
<td>1.250 (31.75)</td>
<td>1.438 (36.53)</td>
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<td>3.000 (76.20)</td>
<td>.375 (9.53)</td>
<td>.313 (7.93)</td>
<td>1.500 (38.10)</td>
<td>1.688 (42.88)</td>
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<tr>
<td></td>
<td>3.750 (95.25)</td>
<td>.625 (15.88)</td>
<td>.563 (14.29)</td>
<td>1.875 (47.63)</td>
<td>2.188 (55.56)</td>
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<tr>
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<td>4.500 (114.30)</td>
<td>.625 (15.88)</td>
<td>.563 (14.29)</td>
<td>2.250 (57.15)</td>
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<td>5.500 (139.70)</td>
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<td>3.250 (82.55)</td>
<td>3.625 (92.08)</td>
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NOTE: Care should be taken in machining the keyway slot for a tight fit. Only one keyway should be used per cylinder.

Valve In Head
Integral Shock Absorber
Multi-Position Duplex

Multi-Position Back-to-Back
Oversize Piston Rod
Protective Rod Boot

Air to Air Booster/Pump
Force Multiplication Tandem

Other Custom Cylinders:
Norgren designs and manufactures literally hundreds of specialty cylinders. We welcome the opportunity to provide you with a customized cylinder that meets the specific requirements of your application. For more information on how to order custom cylinders consult factory.
**Stroke Signal Valve**

Stroke Signal Valves emit a positive pneumatic signal to indicate the position of the piston at each end of the cylinder stroke. It can be used to energize other air or electrical mechanisms in a control circuit.

The design involves a three-way normally closed poppet valve that uses the same pressure that drives the cylinder piston to provide a pneumatic signal.

Stroke Signal Valves are positioned on either or both ends of the cylinder according to your specifications. Each cylinder bore has minimum stroke limitations (See page ACT-1-89.) The standard Signal Valve begins to give a pneumatic signal when the cylinder piston is within 1/8" of the end of the stroke. For signal distances less than 1/8", consult factory.

**Pneumatic Valve**

Pneumatic valves incorporate a single-pole, double-throw electric conversion switch with a Stroke Signal Valve. (Optional double-pole, double-throw switches are available.)

The electric conversion switch screws directly into the outlet port of the Stroke Signal Valve, enabling the Pneumatic Valve to convert air pulses into electrical signals without the need of complicated electro-pneumatic circuitry.

**How to Order Stroke Signal Valves**

Add suffix SV ( ) after cylinder model number.
Indicate in ( ) Stroke Signal Valve location: list head position first, cap position last.
Valve position on head and/or cap should be indicated by position number 1, 2, 3 or 4.
Example: J333A1-SV(02) – Bore x Stroke = Stroke Signal Valve mounted on cap end only, position 2.

**How to Order Pneumatic Valves**

Add suffix EV after cylinder model number.
Example: J333A1-EV(42S)* * – Bore x Stroke = Pneumatic Valve mounted on head end, position 4 and cap end, position 2, with single-pole – Double-throw.

* S = Single-pole – Double-throw switch
  D = Double-pole – Double-throw switch

**Pneumatic & Pneumatic Valves Shown**

**How the Valve Works**

**Start of the Stroke**

At the start of the stroke, the stroke signal valve is closed because areas (1) and (2) are equally pressurized (A), with area (1) being several times greater than area (2). Outlet port is vented to atmosphere.

**Mid-Stroke**

The same condition exists at mid-stroke with the exception that a greater pressure (B) has been applied to drive the piston.

**End of the Stroke**

At the end of the stroke the piston seal has passed the inboard air hole (3), supplying full pressure against area (2) When air has exhausted through (A) the valve stem shifts and pressure is supplied to the outlet port of the signal valve.

* 1/8" from bottoming.
Dimensions and Mountings: Pneumatic Valve

Minimum Stroke

<table>
<thead>
<tr>
<th>Minimum Stroke</th>
<th>Cylinder Bore</th>
</tr>
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<tbody>
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<td>1 1/2&quot;</td>
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</table>

Mounting Specifications
Position 4 Standard on Mounting Styles 1, 3, 4, 5, 6, 9, 11, 12, 15, 16, 20, 21, 22, 32, 42, 52 & 60.

Position 3 Standard on Mounting Styles 7", 8" & 10.

*SV or EV cannot be specified with cushion (adjustable) on same end (head or cap).

Stroke signal valves cannot be mounted on same side as port location or cushion adjustment location.

Design Features
Electrical Ratings:
- 10 amp 110-220 v-ac
- 10 amp 28 v-dc

Pressure Ratings: Actuation – 30 psig

Modes of Operation:
- Single-pole – Double-throw
- Double-pole – Double-throw

Single-pole – Double-throw is standard.
(For Double-pole – Double-throw specify DP-DT.)

Lead Lengths: 18" standard

Maximum Pressure: 250 psi

Ambient Temperature Rating:
- 40°F to 250°F
(-40°C to 121°C)

3 Wire Switch:
Black = Common
Red = N.O. Contact
Green = N.C. Contact

Type E
One or Two Stroke Signal Valves Mounted on Opposite Sides

Type F
Two Stroke Signal Valves Mounted on the Same Side
• Magnetically operated, non-contact sensing system.
• Consists of a magnet in the piston, and a sensing switch clamped on the cylinder tie rod.
• One or more switches may be mounted to provide an indication of piston position or to control or initiate any sequence function.
• Adjustable mounting brackets allow for switches to be securely positioned anywhere along the range of piston travel.
• LED indicator light facilitates installation and troubleshooting.
• Mounting brackets standard with switches.

Specifications

<table>
<thead>
<tr>
<th>Switch Model</th>
<th>CS8-2-04 Reed</th>
<th>CS8-2-31 Solid State</th>
<th>CS8-2-32 Solid State</th>
</tr>
</thead>
<tbody>
<tr>
<td>Bore Sizes</td>
<td>1 1/2&quot; thru 2 1/2&quot;</td>
<td>1 1/2&quot; thru 2 1/2&quot;</td>
<td>1 1/2&quot; thru 2 1/2&quot;</td>
</tr>
<tr>
<td>Switch Type</td>
<td>Reed Switch</td>
<td>Solid State &amp; Light, Source PNP</td>
<td>Solid State &amp; Light, Sinking NPN</td>
</tr>
<tr>
<td>Function</td>
<td>SPST Normally Open</td>
<td>Normally Open</td>
<td>Normally Open</td>
</tr>
<tr>
<td>Switching Voltage</td>
<td>5-120 VDC/50/60 Hz</td>
<td>6-24 VDC</td>
<td>6-24 VDC</td>
</tr>
<tr>
<td>Switching Current</td>
<td>.5 Amp Max, .005 Amp Min</td>
<td>.5 Amp Max</td>
<td>.5 Amp Max</td>
</tr>
<tr>
<td>Switching Power</td>
<td>10 VA</td>
<td>12 Watts Max</td>
<td>12 Watts Max</td>
</tr>
<tr>
<td>Max Voltage Drop</td>
<td>3.5 Volts</td>
<td>5 Volts</td>
<td>5 Volts</td>
</tr>
<tr>
<td>Magnetic Sensitivity</td>
<td>85 Gauss</td>
<td>85 Gauss</td>
<td>85 Gauss</td>
</tr>
<tr>
<td>Enclosure Classification</td>
<td>NEMA 6 &amp; CSA Approved</td>
<td>NEMA 6 &amp; CSA Approved</td>
<td>NEMA 6 &amp; CSA Approved</td>
</tr>
<tr>
<td>Temperature Range</td>
<td>-22°F to +176°F</td>
<td>-22°F to +176°F</td>
<td>-22°F to +176°F</td>
</tr>
</tbody>
</table>

Wiring Diagrams

Switch & Mounting Bracket Dimensions

CS8-2 Series

NOTE:
1-1/2" to 2-1/2" bore steel cylinder is supplied with an aluminum tube as standard. If a 3-1/4" to 12" bore steel cylinder requires switches, the aluminum tube and magnetic piston options must be selected.
Reed Switch Working Principle
Reed switch sensors contain hermetically sealed reed elements (mechanical contacts) which are open in their normal state. When a magnetic field moves within proximity of the switch, magnetism is induced into the leads and forces the contacts to close.

Solid State/Magnetoresistive Working Principle
The solid state (no moving parts) magnetoresistive sensor responds to a parallel magnetic pole by providing a digital signal to the output control circuit. This technique enables the sensing of weak magnetic fields, with no limit to the maximum strength of the magnetic field. Norgren solid state switches are similar to the Hall effect switch.

Application Recommendations and Precautions
To provide maximum reliability,
1. Always stay within the specifications and power rating limitations of the unit installed.
2. Primary and control circuit wiring should not be mixed in the same conduit. Motors will produce high pulses that will be introduced into the control wiring if the wiring is carried in the same conduit.
3. Never connect the switch without a load present. The switch will be destroyed.
4. Some electrical loads may be capacitive. Capacitive loading may occur due to distributed capacity in cable runs over 25 feet. Use switch Model CS7-24 whenever capacitive loading may occur.

<table>
<thead>
<tr>
<th>CS7-04 Reed</th>
<th>CS7-24 Reed</th>
<th>CS7-31 Solid State</th>
<th>CS7-32 Solid State</th>
</tr>
</thead>
<tbody>
<tr>
<td>2” thru 8”</td>
<td>2” thru 8”</td>
<td>2” thru 8”</td>
<td>2” thru 8”</td>
</tr>
<tr>
<td>Reed Switch</td>
<td>Reed Switch</td>
<td>Solid State &amp; Light, Sourcing PNP</td>
<td>Solid State &amp; Light, Sourcing NPN</td>
</tr>
<tr>
<td>*MOV &amp; Light, 3 Wire</td>
<td>*MOV &amp; Light</td>
<td>Normally Open</td>
<td>Normally Open</td>
</tr>
<tr>
<td>Normally Open</td>
<td>Normally Open</td>
<td>Normally Open</td>
<td>Normally Open</td>
</tr>
<tr>
<td>5-240 VDC</td>
<td>24-240 VAC</td>
<td>6-24 VDC</td>
<td>6-24 VDC</td>
</tr>
<tr>
<td>50/60 Hz</td>
<td>50/60 Hz</td>
<td>50/60 Hz</td>
<td>50/60 Hz</td>
</tr>
<tr>
<td>1 Amp Max</td>
<td>4 Amp Max</td>
<td>1 Amp Max</td>
<td>1 Amp Max</td>
</tr>
<tr>
<td>50 Amp Inrush</td>
<td>50 Amp Inrush</td>
<td>50 Amp Inrush</td>
<td>50 Amp Inrush</td>
</tr>
<tr>
<td>30 Watts Max</td>
<td>100 Watts Max</td>
<td>24 Watts Max</td>
<td>24 Watts Max</td>
</tr>
<tr>
<td>3 Volts</td>
<td>N/A</td>
<td>5 Volts</td>
<td>5 Volts</td>
</tr>
<tr>
<td>85 Gauss</td>
<td>85 Gauss</td>
<td>85 Gauss</td>
<td>85 Gauss</td>
</tr>
<tr>
<td>Parallel</td>
<td>Parallel</td>
<td>Parallel</td>
<td>Parallel</td>
</tr>
<tr>
<td>NEMA 6 &amp; CSA Approved</td>
<td>NEMA 6 &amp; CSA Approved</td>
<td>NEMA 6 &amp; CSA Approved</td>
<td>NEMA 6 &amp; CSA Approved</td>
</tr>
<tr>
<td>-22°F to +176°F</td>
<td>-22°F to +176°F</td>
<td>-22°F to +176°F</td>
<td>-22°F to +176°F</td>
</tr>
</tbody>
</table>

NOTE: For 8” bore add 9 to part number. Example: CS7-9-04. For 10” and 12” bore, consult the factory.
Right Angle (Banjo) Flow Controls

- 360° rotation of the banjo body around the bolt allows for ideal positioning of tubing.
- Low profile and reduced physical size provide space saving installations, while internal configuration provides the flow capacity of much bulkier designs.
- Tapered adjustment needles with large adjustment ranges provide linear flows and greater precision.
- Knurled adjustment knobs (w/screw driver slot) and lock nuts on 12 VA0 and 10 TA0 series provide finger tip adjustment. Tamper resistance on the 10 K51 is provided by a slotted adjustment screw covered by a protective plastic cap.
- Direct mounting of flow controls on pneumatic actuators minimizes the adjustment problems encountered due to the compressibility of air in long tubing runs between the actuator and control valving. Additionally, direct mounted flow controls end the confusion over which actuator in a circuit is being controlled.
- Metallic components are limited to nickel plated all brass construction, eliminating the potential problems encountered with products constructed of dissimilar metals.
- Adjustment needles and banjo bodies are retained, preventing accidental loss of the needle or lock nut.

Operation
Flow Controls are check adjustable controls of the meter out type. Compressed air passes freely into the push-in fitting portion of the flow control, flowing past the check seal and entering the connected component. In reverse flow conditions, air passes back into the flow control and energizes the check seal. Air must now flow through the metered passage controlled by the tapered adjustment needle of the flow control, and finally exits through the push-in fitting end.

Specifications
- Fluid: Compressed air. For other types of compressed gases, please consult factory.
- Working Pressure: 0 to 150 psig (0 to 10 bar)
- Temperature Range: 0° to 175°F (-20° to 80°C)

Materials of Construction
- Banjo bolt, collet, adjustment knob and lock nut: Nickel plated brass
- Tapered adjusting needle: Brass
- Banjo Body: 10 TA0 and 12 VA0 XXXX: Thermoplastic
  10 K51 XXXX: Nickel plated brass
- O-rings and check-seal: Silicone free Nitrile
- Sealing washer: Thermoplastic (ISO G and 10-32 UNF)
- Tubing: Nylon 11 or 12, 95 durometer polyurethane.
- Thread Sealant: Thread sealant is applied to the full circumference of tapered male threads.

Options
Special versions of the flow controls are available, including meter-out and bi-directional control configurations. Please consult factory with specific quantities and requirements.
Flow Controls
All Dimensions in Inches (mm)

<table>
<thead>
<tr>
<th>A</th>
<th>B</th>
<th>C</th>
<th>D</th>
<th>E</th>
<th>F</th>
<th>G</th>
<th>J</th>
<th>H</th>
<th>K</th>
<th>L</th>
</tr>
</thead>
<tbody>
<tr>
<td>Tube O.D.</td>
<td>NPTF or UNF Thread</td>
<td>Part Number</td>
<td>5/32&quot;</td>
<td>1/4&quot;</td>
<td>3/8&quot;</td>
<td>1/2&quot;</td>
<td>3/4&quot;</td>
<td>1/2&quot;</td>
<td></td>
<td></td>
</tr>
<tr>
<td>10-32 UNF</td>
<td>1/2 VA0 0219</td>
<td>0.30 (7.62)</td>
<td>0.45 (11.43)</td>
<td>0.87 (22.10)</td>
<td>0.31 (7.87)</td>
<td>0.35 (8.89)</td>
<td>0.63 (16.00)</td>
<td>2.09 (53.09)</td>
<td>0.89 (22.61)</td>
<td>9/16&quot;</td>
</tr>
<tr>
<td>1/8</td>
<td>1/2 VA0 0419</td>
<td>0.43 (10.93)</td>
<td>0.51 (12.95)</td>
<td>0.91 (23.11)</td>
<td>0.31 (7.87)</td>
<td>0.35 (8.89)</td>
<td>0.63 (16.00)</td>
<td>2.09 (53.09)</td>
<td>0.89 (22.61)</td>
<td>9/16&quot;</td>
</tr>
<tr>
<td>1/4</td>
<td>1/2 VA0 0428</td>
<td>0.43 (10.93)</td>
<td>0.53 (13.46)</td>
<td>1.00 (25.4)</td>
<td>0.39 (9.90)</td>
<td>0.43 (10.93)</td>
<td>0.79 (20.07)</td>
<td>2.64 (67.06)</td>
<td>1.16 (29.46)</td>
<td>11/16&quot;</td>
</tr>
<tr>
<td>3/8&quot;</td>
<td>1/2 VA0 0628</td>
<td>0.57 (14.48)</td>
<td>0.77 (19.66)</td>
<td>1.24 (31.52)</td>
<td>0.47 (11.94)</td>
<td>0.51 (12.95)</td>
<td>0.87 (22.10)</td>
<td>3.07 (77.97)</td>
<td>1.30 (33.02)</td>
<td>3/4&quot;</td>
</tr>
<tr>
<td>1/2&quot;</td>
<td>1/2 VA0 0748</td>
<td>0.71 (18.03)</td>
<td>0.91 (23.11)</td>
<td>1.50 (38.10)</td>
<td>0.63 (16.00)</td>
<td>0.71 (18.03)</td>
<td>1.06 (26.92)</td>
<td>3.66 (92.97)</td>
<td>1.65 (41.91)</td>
<td>7/8&quot;</td>
</tr>
</tbody>
</table>

**K51 Series**

Flow Characteristics

<table>
<thead>
<tr>
<th>A</th>
<th>B</th>
<th>C</th>
<th>D</th>
<th>E</th>
<th>G</th>
<th>H</th>
</tr>
</thead>
<tbody>
<tr>
<td>Tube O.D.</td>
<td>ISO G or Metric Thread</td>
<td>Part Number</td>
<td>4&quot;</td>
<td>5&quot;</td>
<td>6&quot;</td>
<td>8&quot;</td>
</tr>
<tr>
<td>M5 X .8</td>
<td>10 K51 0405</td>
<td>0.31 (7.87)</td>
<td>0.43 (10.93)</td>
<td>0.53 (13.46)</td>
<td>0.55 (13.97)</td>
<td>0.55 (13.97)</td>
</tr>
<tr>
<td>10 K51 0505</td>
<td>0.31 (7.87)</td>
<td>0.43 (10.93)</td>
<td>0.53 (13.46)</td>
<td>0.55 (13.97)</td>
<td>0.55 (13.97)</td>
<td>0.67 (17.01)</td>
</tr>
<tr>
<td>10 K51 0605</td>
<td>0.31 (7.87)</td>
<td>0.43 (10.93)</td>
<td>0.53 (13.46)</td>
<td>0.55 (13.97)</td>
<td>0.55 (13.97)</td>
<td>0.67 (17.01)</td>
</tr>
<tr>
<td>10 K51 0628</td>
<td>0.67 (17.01)</td>
<td>0.51 (12.95)</td>
<td>0.77 (19.66)</td>
<td>0.51 (12.95)</td>
<td>0.77 (19.66)</td>
<td>0.51 (12.95)</td>
</tr>
<tr>
<td>10 K51 0639</td>
<td>0.97 (24.64)</td>
<td>0.51 (12.95)</td>
<td>0.77 (19.66)</td>
<td>0.51 (12.95)</td>
<td>0.77 (19.66)</td>
<td>0.51 (12.95)</td>
</tr>
<tr>
<td>10 K51 0739</td>
<td>1.44 (36.57)</td>
<td>0.51 (12.95)</td>
<td>0.77 (19.66)</td>
<td>0.51 (12.95)</td>
<td>0.77 (19.66)</td>
<td>0.51 (12.95)</td>
</tr>
<tr>
<td>10 K51 0748</td>
<td>2.03 (51.56)</td>
<td>0.51 (12.95)</td>
<td>0.77 (19.66)</td>
<td>0.51 (12.95)</td>
<td>0.77 (19.66)</td>
<td>0.51 (12.95)</td>
</tr>
<tr>
<td>10 K51 0848</td>
<td>2.64 (67.06)</td>
<td>0.51 (12.95)</td>
<td>0.77 (19.66)</td>
<td>0.51 (12.95)</td>
<td>0.77 (19.66)</td>
<td>0.51 (12.95)</td>
</tr>
<tr>
<td>10 K51 1048</td>
<td>3.25 (82.60)</td>
<td>0.51 (12.95)</td>
<td>0.77 (19.66)</td>
<td>0.51 (12.95)</td>
<td>0.77 (19.66)</td>
<td>0.51 (12.95)</td>
</tr>
<tr>
<td>10 K51 1148</td>
<td>3.87 (98.42)</td>
<td>0.51 (12.95)</td>
<td>0.77 (19.66)</td>
<td>0.51 (12.95)</td>
<td>0.77 (19.66)</td>
<td>0.51 (12.95)</td>
</tr>
<tr>
<td>10 K51 1248</td>
<td>4.49 (113.46)</td>
<td>0.51 (12.95)</td>
<td>0.77 (19.66)</td>
<td>0.51 (12.95)</td>
<td>0.77 (19.66)</td>
<td>0.51 (12.95)</td>
</tr>
</tbody>
</table>

Brookville, OH USA Phone 937-833-4033 www.norgren.com

ACT-1-93
Series A, NFPA Aluminum Air Cylinders (ø1-1/2" to 8"), Cylinder Features

All Dimensions in Inches (mm)

Rod Alignment Coupler
The Rod Alignment Coupler allows 1/16" of radial float and 2° of spherical movement. This prevents cylinder binding due to misalignment thus extending bearing and seal life, and permits greater tolerance between the centerline of the cylinder and mating part for simplified installation.

Air-Oil Tank
Available in 5 practical bore sizes: 1 1/8”, 2”, 3 1/4”, 5”, and 8”; the Air-Oil Tank includes a translucent fiberglass tube which permits viewing of the tank oil level from any position, internal baffles that reduce foaming and aeration of the system oil resulting in maximum cylinder control, and standard angle mounting brackets (except 1 1/8” bore) easily removed for convenient fluid port positioning.

How to Figure Length of Volume
The following equations are given to help you in selecting the right air/oil tank volume for your particular application.

Volume of Cylinder:  
- Cap End Cylinder Bore Area x Stroke = Volume
- Head End Cylinder Bore Area – (Piston Rod Area*) x Stroke = Volume  * Reference Page ACT-1-13 for Areas.

Length of Tank = Volume of Cylinder x 1.3**  **30% minimum recommended reserve working volume.

Tank Bore Area

Final Length of Volume of Tank = Working length of tank + 2" minimum safety factor to prevent aeration of oil.  
Note: Length must be at least 3”.

Air-Oil Tank Dimensions

<table>
<thead>
<tr>
<th>Bore</th>
<th>1-1/8&quot;</th>
<th>2&quot;</th>
<th>3-1/4&quot;</th>
<th>5&quot;</th>
<th>8&quot;</th>
</tr>
</thead>
<tbody>
<tr>
<td>ACT-225</td>
<td>1.500</td>
<td>2.687</td>
<td>4.000</td>
<td>5.625</td>
<td>6.625</td>
</tr>
<tr>
<td>ACT-04</td>
<td>1.250</td>
<td>2.000</td>
<td>2.500</td>
<td>3.625</td>
<td>4.625</td>
</tr>
<tr>
<td>ACT-05</td>
<td>1.250</td>
<td>2.000</td>
<td>2.500</td>
<td>3.625</td>
<td>4.625</td>
</tr>
<tr>
<td>ACT-10</td>
<td>1.250</td>
<td>2.000</td>
<td>2.500</td>
<td>3.625</td>
<td>4.625</td>
</tr>
<tr>
<td>ACT-16</td>
<td>1.250</td>
<td>2.000</td>
<td>2.500</td>
<td>3.625</td>
<td>4.625</td>
</tr>
</tbody>
</table>

Note: Maximum operating pressure 250 PSI.

Air-Oil Tank Volumes (cubic inches)

<table>
<thead>
<tr>
<th>Bore</th>
<th>1-1/8&quot;</th>
<th>2&quot;</th>
<th>3-1/4&quot;</th>
<th>5&quot;</th>
<th>8&quot;</th>
</tr>
</thead>
<tbody>
<tr>
<td>6&quot;</td>
<td>5.9</td>
<td>18.6</td>
<td>49.8</td>
<td>117.8</td>
<td>301.5</td>
</tr>
<tr>
<td>8&quot;</td>
<td>7.9</td>
<td>25.1</td>
<td>66.4</td>
<td>157.1</td>
<td>402.0</td>
</tr>
<tr>
<td>10&quot;</td>
<td>9.9</td>
<td>31.4</td>
<td>83.0</td>
<td>196.4</td>
<td>502.6</td>
</tr>
<tr>
<td>12&quot;</td>
<td>11.9</td>
<td>37.6</td>
<td>99.6</td>
<td>235.6</td>
<td>603.1</td>
</tr>
<tr>
<td>14&quot;</td>
<td>13.9</td>
<td>43.9</td>
<td>115.2</td>
<td>274.9</td>
<td>703.6</td>
</tr>
<tr>
<td>16&quot;</td>
<td>15.9</td>
<td>50.2</td>
<td>132.8</td>
<td>314.2</td>
<td>804.1</td>
</tr>
<tr>
<td>18&quot;</td>
<td>17.9</td>
<td>56.5</td>
<td>149.4</td>
<td>353.5</td>
<td>904.5</td>
</tr>
<tr>
<td>20&quot;</td>
<td>19.9</td>
<td>62.8</td>
<td>166.0</td>
<td>392.8</td>
<td>1005.2</td>
</tr>
</tbody>
</table>

How to Order: Specify air-oil tank part number and internal length.  
Example: 2" bore with 6" internal length = AOT-04 x 6
### Option Code Description

<table>
<thead>
<tr>
<th>Option Code</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>A(–)</td>
<td>Stroke Adjustment Single Piston (specify adjustment length) - see page ACT-1-86</td>
</tr>
<tr>
<td>AA(–)</td>
<td>Stroke Adjustment Double Piston (specify adjustment length) - see page ACT-1-86</td>
</tr>
<tr>
<td>AN</td>
<td>Acorn Tie Rod Nuts (Stainless Steel)</td>
</tr>
<tr>
<td>AP</td>
<td>Air/Oil Piston (Piston supplied with O-ring hooded U-cup on cap end for air/oil operation)</td>
</tr>
<tr>
<td>BL</td>
<td>Removable Piston Rod Stud (installed with removable adhesive sealant)</td>
</tr>
<tr>
<td>EN</td>
<td>Electroless Nickel Plated Cylinder</td>
</tr>
<tr>
<td>EV(– –)</td>
<td>Pneumatic Stroke Signal Valve(s): EV(Head Cap) (specify position) - see pages ACT-1-88 &amp; 89</td>
</tr>
<tr>
<td>FG</td>
<td>Black Fiberglass Cylinder Tube</td>
</tr>
<tr>
<td>H</td>
<td>Piston Rod Seals O-ring loaded U-cups - see page ACT-1-86 (A &amp; J Only)</td>
</tr>
<tr>
<td>HR</td>
<td>Case Hardened Piston Rod</td>
</tr>
<tr>
<td>L(– –)</td>
<td>Non-Standard Port Location position 1 standard: L(Head Cap) (specify position 1 thru 4 for head and/or cap)</td>
</tr>
<tr>
<td>LF</td>
<td>Low Friction Cylinder (Nitrile compounded with Teflon® rod and piston seals) (Not available with Ecology series)</td>
</tr>
<tr>
<td>MS</td>
<td>Metal Scraper - see page ACT-1-86</td>
</tr>
<tr>
<td>N(– –)</td>
<td>Cushion Adjust Screw Location position 2 standard:N(Head Cap) (specify position 1 thru 4 for head and/or cap)</td>
</tr>
<tr>
<td>NW</td>
<td>No Wearstrip in Cylinder</td>
</tr>
<tr>
<td>P(–)</td>
<td>Non-Standard Port Sizes – (specify port size for P(H) head only, P(–C) cap only, or P(–) both head &amp; cap)</td>
</tr>
<tr>
<td>PF</td>
<td>Pinned Piston and Rod Assembly - see page ACT-1-86</td>
</tr>
<tr>
<td>PS</td>
<td>Magnetic Piston Modification (no wearstrip) - see page ACT-1-86</td>
</tr>
<tr>
<td>RS</td>
<td>Studed Male Piston Rod End</td>
</tr>
<tr>
<td>RX(–)</td>
<td>Piston Rod Extension Over Standard (specify additional “C” length)</td>
</tr>
<tr>
<td>S</td>
<td>303/304 Stainless Steel Tie Rods &amp; Nuts</td>
</tr>
<tr>
<td>SB</td>
<td>Stainless Steel Rod Bushing Nut</td>
</tr>
<tr>
<td>SC†</td>
<td>Single Acting Spring Extend Cap End of Cylinder - see page ACT-1-86</td>
</tr>
<tr>
<td>SL</td>
<td>Steel Cylinder Tubing</td>
</tr>
<tr>
<td>SR†</td>
<td>Single Acting Spring Retract Rod End of Cylinder - see page ACT-1-86</td>
</tr>
<tr>
<td>SS</td>
<td>303 Stainless Steel Piston Rod</td>
</tr>
<tr>
<td>ST(C)</td>
<td>Stop Tube on Cap End (C) of Cylinder: ST(stop tube length C) - see page ACT-1-87</td>
</tr>
<tr>
<td>ST(R)</td>
<td>Stop Tube on Rod End (R) of Cylinder: ST(stop tube length R) - see page ACT-1-87</td>
</tr>
<tr>
<td>SV(– –)</td>
<td>Stroke Signal Valve(s): SV(Head Cap) – see pages ACT-1-88 &amp; 89</td>
</tr>
<tr>
<td>T(–)</td>
<td>Non-Standard Piston Rod Thread (specify thread)</td>
</tr>
<tr>
<td>TF(–)</td>
<td>Piston Rod Thread Depth Over Standard (Female) (specify additional “A” length) - see page ACT-1-86</td>
</tr>
<tr>
<td>TX(–)</td>
<td>Piston Rod Thread Extension Over Standard (Male) (specify additional “A” length) - see page ACT-1-86</td>
</tr>
<tr>
<td>V</td>
<td>Viton® Seals in Cylinder</td>
</tr>
<tr>
<td>XI(–)</td>
<td>Type #10 Trunnion Set Dimension (MT4 Model Only) (customer must specify length)</td>
</tr>
</tbody>
</table>

Consult Factory for These Options:

<table>
<thead>
<tr>
<th>Option Code</th>
<th>Description</th>
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<tbody>
<tr>
<td>AS</td>
<td>Airsaver Stroke Adjustment</td>
</tr>
<tr>
<td>BB</td>
<td>Cylinders Mounted Back to Back</td>
</tr>
<tr>
<td>BP</td>
<td>British Standard Pipe Cylinder Ports (Parallel) (BSPP)</td>
</tr>
<tr>
<td>BT</td>
<td>British Standard Pipe Cylinder Ports (Tapered) (BSPT)</td>
</tr>
<tr>
<td>CT</td>
<td>Close Tolerance on Cylinder Stroke</td>
</tr>
<tr>
<td>EX</td>
<td>Ecology Piston Seal on Rod End of Cylinder</td>
</tr>
<tr>
<td>LA</td>
<td>Low Friction Cylinder (Pak-Lap® style seals)</td>
</tr>
<tr>
<td>NI</td>
<td>Nituff® Coated Cylinder</td>
</tr>
<tr>
<td>NS</td>
<td>No Silicone Used in Cylinder Assembly</td>
</tr>
<tr>
<td>NT</td>
<td>Nicote® Coated Cylinder</td>
</tr>
<tr>
<td>OE</td>
<td>Zero Stroke/Pneumatic Stroke Signal Valve(s)</td>
</tr>
<tr>
<td>OV</td>
<td>Zero Stroke/Stroke Signal Valve(s)</td>
</tr>
<tr>
<td>PB</td>
<td>Piston Seal O-ring loaded deep U-cup shape</td>
</tr>
<tr>
<td>RB</td>
<td>Rod Boot over Piston Rod</td>
</tr>
<tr>
<td>SA</td>
<td>SAE Cylinder Ports (Straight Thread)</td>
</tr>
<tr>
<td>SM</td>
<td>Stroke Signal Valve (Mounting Only)</td>
</tr>
<tr>
<td>TE</td>
<td>Nituff® Coated Cylinder Tubing</td>
</tr>
<tr>
<td>TK</td>
<td>Thrust Key Plate Mounting - see page ACT-1-87 [01 (MS4), 09 (MS2), and 15 (MS7)]</td>
</tr>
<tr>
<td>VM</td>
<td>Valve Mounting Only</td>
</tr>
<tr>
<td>XE</td>
<td>Ecology Piston Seal on Cap End of Cylinder</td>
</tr>
</tbody>
</table>

**Consult Factory for These Options:**

- **AS**: Airsaver Stroke Adjustment
- **BB**: Cylinders Mounted Back to Back
- **BP**: British Standard Pipe Cylinder Ports (Parallel) (BSPP)
- **BT**: British Standard Pipe Cylinder Ports (Tapered) (BSPT)
- **CT**: Close Tolerance on Cylinder Stroke
- **EX**: Ecology Piston Seal on Rod End of Cylinder
- **LA**: Low Friction Cylinder (Pak-Lap® style seals)
- **NI**: Nituff® Coated Cylinder
- **NS**: No Silicone Used in Cylinder Assembly
- **NT**: Nicote® Coated Cylinder
- **OE**: Zero Stroke/Pneumatic Stroke Signal Valve(s)
- **OV**: Zero Stroke/Stroke Signal Valve(s)
- **PB**: Piston Seal O-ring loaded deep U-cup shape
- **RB**: Rod Boot over Piston Rod
- **SA**: SAE Cylinder Ports (Straight Thread)
- **SM**: Stroke Signal Valve (Mounting Only)
- **TE**: Nituff® Coated Cylinder Tubing
- **TK**: Thrust Key Plate Mounting - see page ACT-1-87 [01 (MS4), 09 (MS2), and 15 (MS7)]
- **VM**: Valve Mounting Only
- **XE**: Ecology Piston Seal on Cap End of Cylinder

---

*Standard available for 1½”, 2”, 2½” bores, 12” max stroke. (Stroke length doubles - 24” max); 12 lbs. force preload, 30 lbs. force compressed. Cushions not available on spring end. For other spring forces, bore sizes or longer strokes, consult factory.*
Cylinder Order Information

**EA** 01 - 7 7 - A 1 - HR-L(14)-MS-P(1/4)-V - 2" X 6"

**Mounting Options**

01 Side Tapped (MS4)
03 Head Rectangular Flange (MF1)
04 Cap Rectangular Flange (MP2)
04 Cap Square (MS4) - 7" & 8" Bores
05 Basic Cylinder No Mounting (MX0)
06 Both Ends (4) Tie Rods Ext. (MX1)
68 Both Ends (2) Tie Rods Ext. (MX4)
6G Cap Tie Rods Ext. (MX5)
6R Head Tie Rods Ext. (MX6)
7R Removable Head Trunnion (MT1) - A & EA
07 Head Trunnion (MT1) - J & EJ
08 Cap Trunnion (MT2) - J & EJ
09 Side Lugs (MS2)
10 Center Trunnion (MT4)
11 Side End Angles (MS1)
12 Cap Fixed Clevis (MP1)
15 Side End Lugs (MS7)
16 Sleeve Nut Construction (Universal)
20 Head Square Range (MPS)
21 Cap Square Range (MP2)
22 Detachable Cap Clevis (MP2)
22 Detachable Cap Eye (MP2)
32 Cap Fixed Eye (MP3)
42 Detachable Cap Eye (MP4)
52 Spherical Bearing
60 Base Bar (Not NFPA A & EA Only)

**Piston Rod Diameters**

A** 5/8" Standard on 1 1/2", 2", 2 1/2" Standard on 3 1/4", 4", 5" B** 1" Oversized on 1 1/2", 2", 2 1/2" C** 1 1/8" Standard on 6", 7", 8" Oversized on 3 1/4", 4", 5"

**Piston Rod Threads Type**

1 Small Male (Solid)
2 Intermediate Thread Male (Solid)
3 Female
6 Full Thread Male (Solid)
7 Plain Rod End

**Port and Cushion Adjustment Positions**

As viewed from rod end:
Port standard position 1, Cushion Adjustment standard position 2.
NOTE: A Port and a Cushion Adjustment cannot be in the same position.

**EXAMPLE:** Series EJ Cylinder – MS4 side tapped mount – Adjustable cushion in head (Position 2) – Adjustable cushion in cap (Position 2) – 5/8" piston rod diameter – Small male (solid) piston rod thread – Case hardened rod – Head port location at 1 – Cap port location at 4 – Metal rod scraper option – 1/4" special port size – Viton seals option – 2" X 6" bore and stroke.

**IMPORTANT:** Write out bore and stroke completely as shown in example.

**Reed & Solid State Switches**

Available on all bore sizes – order separately.
See pages ACT-1-90 & ACT-1-91 for specifications.

**NOTE:** Consult factory when using competitive position sensing devices.
Piston Seal Kits (Includes: 2 piston seals, 1 wear ring and 2 tube end seals.)

<table>
<thead>
<tr>
<th>Bore</th>
<th>Series A &amp; J</th>
<th>Series EA &amp; EJ</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Buna N</td>
<td>Buna N</td>
</tr>
<tr>
<td></td>
<td>Viton</td>
<td>Viton</td>
</tr>
<tr>
<td>1-1/2&quot; (38.10)</td>
<td>AJK-153</td>
<td>VAJK-153</td>
</tr>
<tr>
<td></td>
<td>EJK-153</td>
<td>VEJK-153</td>
</tr>
<tr>
<td>2&quot;   (50.80)</td>
<td>AJK-203</td>
<td>VAJK-203</td>
</tr>
<tr>
<td></td>
<td>EJK-203</td>
<td>VEJK-203</td>
</tr>
<tr>
<td>3-1/4&quot; (82.55)</td>
<td>AJK-253</td>
<td>VAJK-253</td>
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<tr>
<td></td>
<td>EJK-253</td>
<td>VEJK-253</td>
</tr>
<tr>
<td>4&quot;   (101.60)</td>
<td>AJK-403</td>
<td>VAJK-403</td>
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<tr>
<td></td>
<td>EJK-403</td>
<td>VEJK-403</td>
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<tr>
<td>5&quot;   (127.00)</td>
<td>AJK-503</td>
<td>VAJK-503</td>
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<tr>
<td></td>
<td>EJK-503</td>
<td>VEJK-503</td>
</tr>
<tr>
<td>6&quot;   (152.40)</td>
<td>AJK-603</td>
<td>VAJK-603</td>
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<td>EJK-603</td>
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<tr>
<td>7&quot;   (177.80)</td>
<td>AJK-703</td>
<td>VAJK-703</td>
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<td>EJK-703</td>
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<tr>
<td>8&quot;   (203.20)</td>
<td>AJK-803</td>
<td>VAJK-803</td>
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<tr>
<td>10&quot;  (254.00)</td>
<td>AJK-1003</td>
<td>VAJK-1003</td>
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<td>EJK-1003</td>
<td>Consult Factory</td>
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<tr>
<td>12&quot;  (304.80)</td>
<td>AJK-1203</td>
<td>VAJK-1203</td>
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<td>EJK-1203</td>
<td>Consult Factory</td>
</tr>
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</table>

NOTE: When ordering repair kits for Series A, EA, J and EJ cylinders, please specify the type of kit, the cylinder model number, and the cylinder bore. This will ensure that you receive the proper repair kit(s).

Rod Bearing Kits for Series A, EA, J & EJ
(Includes: Bearing Assembly, Rod Seal, Wiper & O-Ring.)

<table>
<thead>
<tr>
<th>Rod Diameter</th>
<th>5/8&quot; (15.88)</th>
<th>1&quot; (25.40)</th>
<th>1-3/4&quot; (34.93)</th>
<th>2&quot; (50.80)</th>
<th>2-1/2&quot; (63.50)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Buna N</td>
<td>RBK-15</td>
<td>RBK-25</td>
<td>RBK-35</td>
<td>RBK-45</td>
<td>RBK-55</td>
</tr>
<tr>
<td>Viton</td>
<td>VRBK-15</td>
<td>VRBK-25</td>
<td>VRBK-35</td>
<td>VRBK-45</td>
<td>VRBK-55</td>
</tr>
</tbody>
</table>

Piston Rod Seal Kits for Series A, EA, J & EJ
(Includes: Rod Seal, Wiper & O-Ring.)

<table>
<thead>
<tr>
<th>Rod Diameter</th>
<th>5/8&quot; (15.88)</th>
<th>1&quot; (25.40)</th>
<th>1-3/4&quot; (34.93)</th>
<th>2&quot; (50.80)</th>
<th>2-1/2&quot; (63.50)</th>
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</thead>
<tbody>
<tr>
<td>Buna N</td>
<td>VSWK-15</td>
<td>VSWK-25</td>
<td>VSWK-35</td>
<td>VSWK-45</td>
<td>VSWK-55</td>
</tr>
</tbody>
</table>

Cushion Seal Kits for Series A, EA, J & EJ
(Single Rod End includes: 1 head and 1 cap cushion seal.)

<table>
<thead>
<tr>
<th>Rod</th>
<th>Bore</th>
<th>1-1/2&quot; (38.10)</th>
<th>2&quot; (50.80)</th>
<th>2-1/2&quot; (63.50)</th>
<th>3-1/4 - 5&quot; (82.55 - 127.00)</th>
<th>6&quot; - 8&quot; (152.40 - 203.20)</th>
<th>10&quot; - 12&quot; (254.00 - 304.80)</th>
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</thead>
<tbody>
<tr>
<td>2&quot;</td>
<td>Buna</td>
<td>CSK-45-43</td>
<td>CSK-45-43</td>
<td>CSK-45-43</td>
<td>CSK-45-43</td>
<td>CSK-45-43</td>
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</tr>
<tr>
<td></td>
<td>Viton</td>
<td>VCSK-45-43</td>
<td>VCSK-45-43</td>
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<td>VCSK-45-43</td>
<td>VCSK-45-43</td>
<td>VCSK-45-43</td>
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</tbody>
</table>

Cushion Seal Kits for Series A, EA, J & EJ
(Double Rod End includes: 2 head cushion seals.)

<table>
<thead>
<tr>
<th>Rod</th>
<th>Bore</th>
<th>1-1/2&quot; (38.10)</th>
<th>2&quot; (50.80)</th>
<th>2-1/2&quot; (63.50)</th>
<th>3-1/4 - 5&quot; (82.55 - 127.00)</th>
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</tr>
</thead>
<tbody>
<tr>
<td>1&quot;</td>
<td>Buna</td>
<td>CSK-25-63</td>
<td>CSK-25-63</td>
<td>CSK-25-63</td>
<td>CSK-25-63</td>
<td>CSK-25-63</td>
<td>CSK-25-63</td>
</tr>
</tbody>
</table>

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