MSE MSR Series NFPA
MULTI-STAGE
Aluminum Cylinders
1.50” to 8.00” Bore

Single Rod End  Page 118

Force Chart  Page 127

95% OF OUR CYLINDERS SHIP IN 2-3 DAYS!
ONE DAY RUSH SERVICE AVAILABLE ON ALL CATALOGED CYLINDER MODELS!
SERIES ‘MS’: MULTI-STAGE

FORCE MULTIPLYING CYLINDERS

The TRD MSE and MSR Series are double acting, single rod end cylinders that multiply the force output by supplying air to multiple pistons. The MSE multiplies the force on the extend stroke, the MSR multiplies the force on the retract stroke. Both models use only one piston on the opposite stroke, saving air volume and operating costs.

Benefits
- Rated for 125 PSI Air, or Hydraulic (non-shock)
- Eliminates the need for high pressure systems
- Bore size vs. output force saves space
- Optional Double Rod End Models available
- Optional force multiplying in both extend and retract strokes available

Note: Models MSR & MSED are not field repairable – units must be returned to factory for service or repair.

How They Work

Model MSE
Extension-air supplied to multiple pistons
Retraction-air supplied to one piston

Model MSR
Retraction-air supplied to multiple pistons
Extension-air supplied to one piston

Force multiplying in both Extend and Retract strokes
(Note: Overall lengths are increased consult factory for details)

To Order, specify:
“MSE–MSR” as model number.

Extension AND Retraction-air supplied to multiple pistons

Model MSE–MSR
2 Stage Shown
HOW TO ORDER: SERIES ‘MS’ (MULTI-STAGE)

- Force Multiplier Air and Non-Shock Hydraulic Cylinders 125 PSI
- Eight Bore Sizes 1.50” - 8.00”
- Extend 2, 3, 4 or 5 Stages through 5.00” Bores
- Extend or Retract 2, 3 or 4 Stages through 8.00” Bores
- Exposed Tie Rod and Nut Construction (similar to ‘TA’)
- ‘FM’ Flush Mount construction available as an option

ORDERING EXAMPLES:

EXAMPLE 1: MSE-MSR MF1 3.25” Bore, 2.00” Stroke, 3 Stage:
MSE-MSR MF1 3.25” x 2 x 3 S = Extend ports 5, 5, and 5 Retract ports 1, 6, and 6

EXAMPLE 2: Double Rod End MS4 Mount, 2 Stage, 6.00” Bore, 3.00” Stroke, Force Multiplied in RETRACT with Magnetic Piston for REED Switches is:
MSE-MSR 6 x 3 x 2S - MPR (Note: MPR Option adds 0.750” to Cylinder Length)

ORDERING EXAMPLES:

EXAMPLE 1:
MSE     -   MF1    -                  -   2   x   3   x   4S    -   MPR

EXAMPLE 2:
MSE     -   MF1    -                  -   2   x   3   x   4S    -   MPR

OPTIONS

- ADD LENGTH TO CYLINDER - SEE “OPTION LENGTH ADDER” CHART BELOW.
- EXTENDED PISTON ROD THREAD (Example: A = .5”)
- ADJUSTABLE STROKE, RETRACT (SPECIFY LENGTH, EXAMPLE: AS = .4”)
- 2C  26” URETHANE BUMPER BOTH ENDS
- 2D  26” URETHANE BUMPER CAP ONLY
- 2BH  26” URETHANE BUMPER HEAD ONLY
- BSP  BISP PORTS (SPECIFY SIZE, EXAMPLE: BSP = .25”)
- EXTENDED PISTON ROD (EXAMPLE: C = 0.5”, THEN “1” ROD EXTENSION IS C = 1.5”)
- CAP CUSHION (AVAILABLE ON MSR ONLY)
- EN ELECTROLESS NICKEL PLATED
- FM FLUSH MOUNT HEAD AND CAP (Refer to factory for dimensions)
- CUSHION ADJUSTMENT POSITIONS
- EXTENDED PISTON ROD THREAD (Example: A = .5”)
- ADJUSTABLE STROKE, RETRACT (SPECIFY LENGTH, EXAMPLE: AS = .4”)

MSE-MSR STANDARD PORT AND CUSHION ADJUSTMENT POSITIONS

- Extend Ports - Positions 5, 5, 5
- Retract Ports - Positions 1, 6, 6
- Cushion Adjustment - Positions 2 & 6
- Always specify standard and non-standard port locations when ordering

SERIES ‘MS’ CYLINDERS: NFPA MOUNTS

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Note: Refer to Options for specifications.

*Steel tubes do not work with MPR magnetic pistons. Refer to Balluff end of stroke sensors within Switches.
SERIES ‘MS’ DIMENSIONS: 2 STAGE EXTEND OR RETRACT
STANDARD ROD DIAMETER BASIC DIMENSIONS ‘MX0’ (NO MOUNT)

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3 STAGE EXTEND OR RETRACT
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- SERIES ‘MS’ DIMENSIONS: 2 STAGE EXTEND OR RETRACT
- STANDARD ROD DIAMETER BASIC DIMENSIONS ‘MX0’ (NO MOUNT)
- SERIES ‘MS’ DIMENSIONS: 3 STAGE EXTEND OR RETRACT
- STANDARD ROD DIAMETER BASIC DIMENSIONS ‘MX0’ (NO MOUNT)
**‘MS’ SERIES CYLINDERS: 4 STAGE EXTEND OR RETRACT**
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**5 STAGE EXTEND OR RETRACT (1.50" - 5.00" BORES ONLY)**
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**SERIES ‘MS’ DIMENSIONS: MULTI-STAGE**

**PISTON ROD END STYLES**

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**About Rod End Styles**

Style 1 Male Rod End is STANDARD

Other NFPA Styles can be specified (see chart).

Need a rod end not listed? NO PROBLEM! Each Piston Rod is made-to-order and does not delay shipment. Coarse UNC threads, Metric threads or just plain rod ends are common. Thread lengths are also made-to-order (Specify: "A"=Length).

NEED SOMETHING NOT LISTED? Just send us a sketch. In most cases, quotes are turned around in one day!
SERIES ‘MS’ DIMENSIONS: MULTI-STAGE

PISTON ROD END STYLES

About Rod End Styles

Style 1 Male Rod End is STANDARD

Other NFPA Styles can be specified (see chart).

Need a rod end not listed? NO PROBLEM! Each Piston Rod is made-to-order and does not delay shipment. Coarse UNC threads, Metric threads or just plain rod ends are common. Thread lengths are also made-to-order (Specify: “A” = Length).

NEED SOMETHING NOT LISTED? Just send us a sketch.
In most cases, quotes are turned around in one day!

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‘MS’ SERIES BASE DIMENSIONS FLIP-OUT (PAGE 122)
SERIES ‘MS’ CYLINDERS: EXTEND OR RETRACT
Oversize Rod Diameter Basic Dimension ‘MX0’ (NO MOUNT)

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*Round retainer 4.00” through 8.00” bore (square retainer shown).
For dimensions not shown, see pages 120 & 121.
MS SERIES CYLINDERS: PIVOT MOUNTS

**Note:** Extruded MP1 mounts are standard (1.50”-8.00” bores). Cast Iron removable mounts are optional and must be requested when ordering (1.50”-6.00” bores).

SERIES ‘MS’ DIMENSIONS: BASE MOUNTS

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For dimensions not shown, see pages 120 & 121.

*Pin included, two (2) pressed in bearings.

**Hex nuts are located on cap end (3.25”-8.00” bores).

SERIES ‘MS’ DIMENSIONS: BOTTOM TAPPED MOUNT DIMENSIONS

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For dimensions not shown, see pages 120 & 121.

Note: Extruded MP1 mounts are standard (1.50”-8.00” bores).

Cast Iron removable mounts are optional and must be requested when ordering (1.50”-6.00” bores).

MULTI-STAGE ‘MP1’ & ‘MP2’ CLEVIS AND ‘MP4’ EYE MOUNT DIMENSIONS

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For dimensions not shown, see pages 120 & 121.
### SERIES ‘MS’ DIMENSIONS: BASE MOUNTS

#### MULTI-STAGE ‘MS1’ ANGLE MOUNT DIMENSIONS

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<tr>
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<th>AL</th>
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<th>AT</th>
<th>FH</th>
<th>S</th>
<th><strong>SA + STROKE PER STAGE</strong></th>
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<td>1.438</td>
<td>1.000</td>
<td>0.375</td>
<td>0.188</td>
<td>0.375</td>
<td>1.750</td>
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<td>1.000</td>
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<td>0.188</td>
<td>0.375</td>
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<td>4.00</td>
<td>1.000 Standard</td>
<td>0.563</td>
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<td>0.125</td>
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<td>8.00</td>
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<td>0.250</td>
<td>0.625</td>
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**Note:** 1.50” bore has four (4) “AB” holes on “S” dimension.

#### MULTI-STAGE ‘MS2’ SIDE LUG MOUNT DIMENSIONS

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<th>BORE (IN.)</th>
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<th>E/2</th>
<th>ST</th>
<th>SU</th>
<th>SW</th>
<th>SZ</th>
<th>TS</th>
<th>US</th>
<th>XS</th>
<th><strong>SS + STROKE PER STAGE</strong></th>
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<td>0.500</td>
<td>1.125</td>
<td>0.375</td>
<td>0.625</td>
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<td>1.375</td>
<td>1.750</td>
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<tr>
<td>2.00</td>
<td>0.625 Standard</td>
<td>0.438</td>
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<td>0.500</td>
<td>1.125</td>
<td>0.375</td>
<td>0.625</td>
<td>3.250</td>
<td>4.000</td>
<td>1.375</td>
<td>1.750</td>
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<td>0.625 Standard</td>
<td>0.438</td>
<td>1.500</td>
<td>0.500</td>
<td>1.125</td>
<td>0.375</td>
<td>0.625</td>
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<td>4.500</td>
<td>1.375</td>
<td>1.750</td>
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<td>0.500</td>
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<td>0.563</td>
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<td>0.500</td>
<td>0.750</td>
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<td>6.500</td>
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<td>1.000 Standard</td>
<td>0.813</td>
<td>2.750</td>
<td>1.000</td>
<td>1.063</td>
<td>0.688</td>
<td>0.563</td>
<td>6.875</td>
<td>8.250</td>
<td>2.063</td>
<td>2.313</td>
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<td>6.00</td>
<td>1.375 Standard</td>
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<td>3.250</td>
<td>1.000</td>
<td>1.313</td>
<td>0.688</td>
<td>0.813</td>
<td>7.875</td>
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<td>9.875</td>
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**Note:** SS dimensions increase 0.500” on double rod cylinders.

For dimensions not shown, see pages 120 & 121.
SERIES ‘MS’ DIMENSIONS: FLANGE MOUNTS

**MULTI-STAGE ‘MF1’ AND ‘MF2’ FLANGE MOUNT DIMENSIONS**

<table>
<thead>
<tr>
<th>BORE</th>
<th>ROD DIAMETER</th>
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<th>F</th>
<th>FB</th>
<th>FH</th>
<th>R</th>
<th>TF</th>
<th>UF</th>
<th>W</th>
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For dimensions not shown, see pages 120 & 121.

SERIES ‘MS’ DIMENSIONS: TIE ROD MOUNTS

**TIE ROD EXTENDED ‘MX1’, ‘MX2’ & ‘MX3’ MOUNT DIMENSIONS**

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Full square bushing retainer on 1.50” - 6.00” bores.
*Round retainer on 8.00” bore. BB dimension from face of head.
For dimensions not shown, see pages 120 & 121.
## SERIES ‘MS’ EFFECTIVE PISTON AREA/FORCE CHART*

<table>
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<tr>
<th>BORE</th>
<th>STAGES</th>
<th>EFF. PISTON AREA (SQ. IN.)</th>
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<td>RETRACT (MSR)</td>
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*Theoretical force: actual force will be reduced due to seal friction.