

# AVCO

*Alloy Valves and Control*

## ACTUATORS PNEUMATIC - TYPE C



### Torque Rating at 80 psig

Double Acting  
115 - 72,000 lbf-in

Spring Return  
50 - 31,500 lbf-in

### Features

Extruded Aluminum Body  
Die-Cast Aluminum End Caps  
Position Indicator with NAMUR slot  
Blow-Out Proof Pinion  
Dual Opposed Rack Pistons  
Linear Torque Output (DA Actuator)  
Adjustable Travel Stops  
NAMUR Solenoid Mount Design

### Temperature Range

Standard (NBR/Buna N O-Ring)  
-4 °F to 175 °F

Low Temperature (LNBR O-Ring)  
-30 °F to 175 °F

High Temperature (Viton O-Ring)  
5 °F to 300 °F

### Supply Pressure

35 psig Minimum  
150 psig Maximum

### Operation Speed

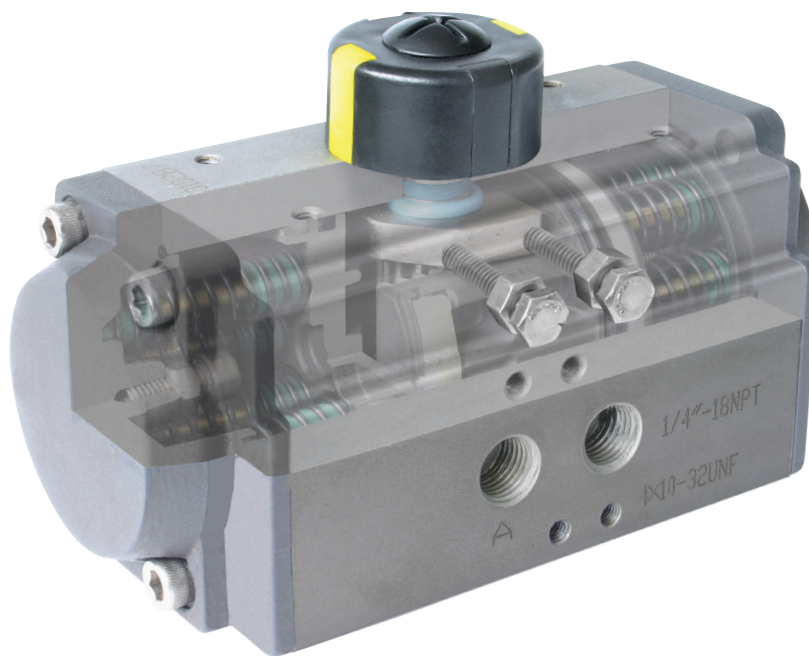
Between 0.4 & 52 seconds  
Depending Upon Model Size

### Industries

Aerospace  
Chemical  
Data Centers  
Food Processing  
Hydraulic  
Oil/Gas  
Pharmaceutical  
Steam

### Applicable Standards

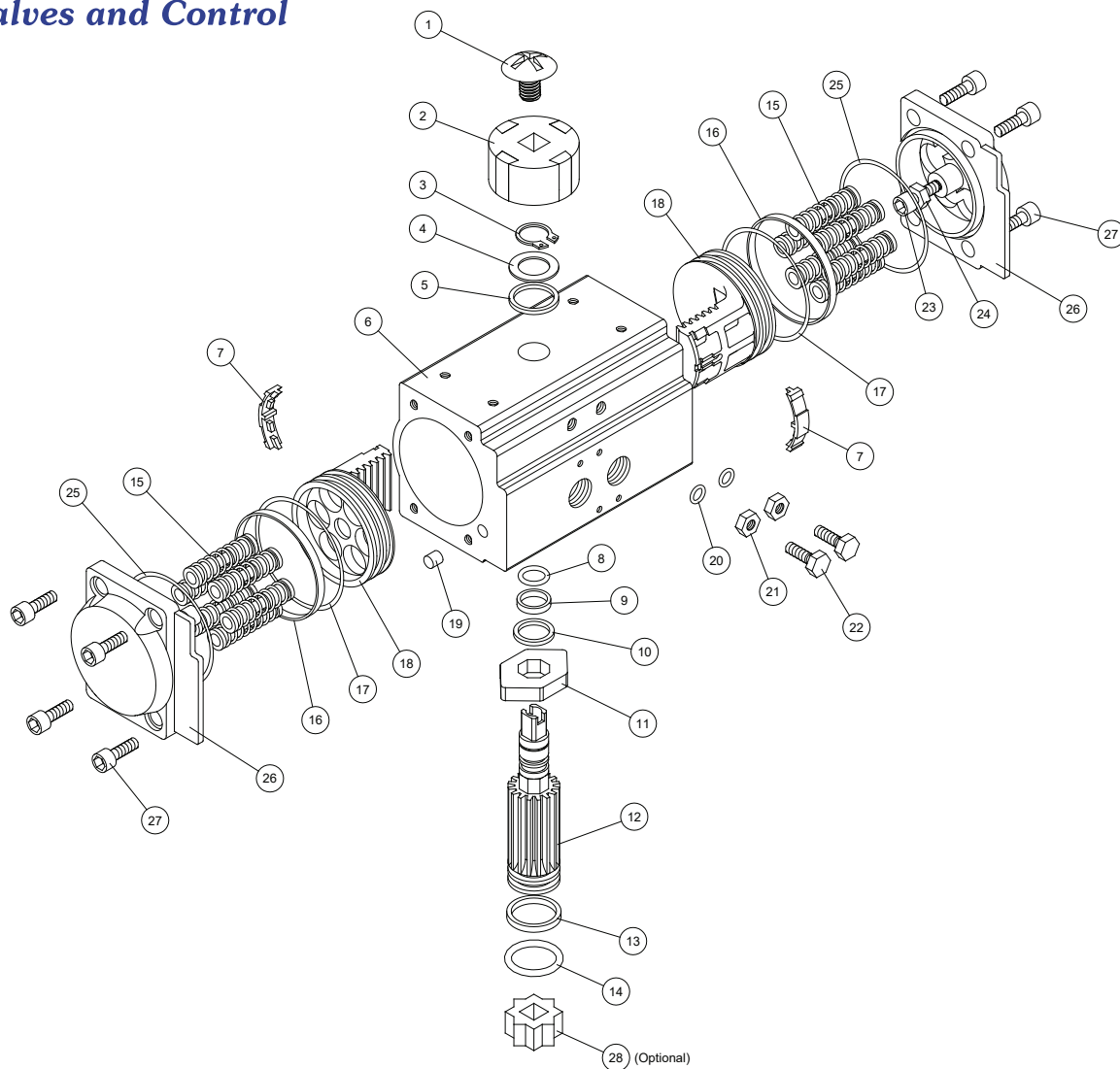
ISO 5211  
NAMUR



### Features and Benefits

All our actuators are made to the highest standards to give long life and durability, coupled with competitive pricing. We pride ourselves in giving the customer exactly what they need and in providing first class after sales care.

- **Extruded Aluminum Body** with hard anodized finish and polished internal surfaces as standard.
- **Die Cast Aluminum End Caps** coated with powder polyester paint, PTFE or nickel plating.
- **Position Indicator** complete with NAMUR slot for simplified accessory mounting.
- **High Precision Nickel Alloy Steel Blow-Out Proof Pinion** for corrosion protection and fully conforming to ISO 5211 and NAMUR.
- **Dual Opposed Rack Pistons** with low friction bearings and guides for a high performance, long cycle life and fast operation. Simple inversion of the pistons for rotation reversal.
- **Linear Torque Output** from 0° through 90° stroke on the double acting actuators.
- **Independent Adjustable Travel Stops** giving  $\pm 5^\circ$  of adjustment for the open and closed position to facilitate exact valve alignment.
- **High Performance Pre-Loaded Spring Cartridges** give greater safety and longer spring life. Double acting actuators can easily be converted to spring return by simply adding the spring cartridges. Different torque requirements can be achieved by simply changing the number of springs.
- **NAMUR Solenoid Mounting Design** enables direct mounting of the solenoid valve to the actuator without the need for adaptors.
- **Stainless Steel 304 Fasteners** are used throughout as standard.
- **Select High Quality O-rings** provide trouble free operation in a wide range of temperatures.
- **Precision Replaceable Inserts** including variable internal geometry configuration for specific customer requests.
- **Specialised Corrosion Protection** available for the body and end caps upon request.

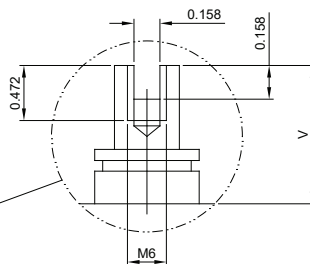
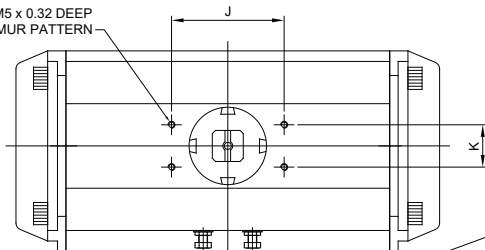


| Item | Parts                   | Material                   | Qty. |
|------|-------------------------|----------------------------|------|
| 1    | Indicator Cap Screw     | Plastic/Stainless Steel    | 1    |
| 2    | Position Indicator      | Plastic (ABS)              | 1    |
| 3    | Pinion Snap Ring        | Stainless Steel 300 Series | 1    |
| 4    | Thrust Washer           | Stainless Steel 300 Series | 1    |
| 5    | Thrust Bearing          | Polyoxymethylene (Delrin)  | 1    |
| 6    | Body                    | Aluminum Alloy (6005-T5)   | 1    |
| 7    | Piston Guide            | Polyoxymethylene (Delrin)  | 2    |
| 8    | O-ring (Pinion Top)     | NBR/Buna N/LNBR/Viton      | 1    |
| 9    | Bearing (Pinion Top)    | Polyoxymethylene (Delrin)  | 1    |
| 10   | Inside Washer           | Polyoxymethylene (Delrin)  | 1    |
| 11   | Cam                     | Stainless Steel 300 Series | 1    |
| 12   | Pinion (Drive Shaft)    | Stainless Steel 300 Series | 1    |
| 13   | Bearing (Pinion Bottom) | Polyoxymethylene (Delrin)  | 1    |
| 14   | O-ring (Pinion Bottom)  | NBR/Buna N/LNBR/Viton      | 1    |

| Item | Parts                      | Material                   | Qty. |
|------|----------------------------|----------------------------|------|
| 15   | Spring (Cartridge)         | High Alloy Spring Steel    | 0-12 |
| 16   | Bearing (Piston)           | Polyoxymethylene (Delrin)  | 2    |
| 17   | O-ring (Piston)            | NBR/Buna N/LNBR/Viton      | 2    |
| 18   | Piston                     | Die-Cast Aluminum          | 2    |
| 19   | Plug                       | NBR/Buna N/LNBR/Viton      | 2    |
| 20   | O-ring (Adjusting Screw)   | NBR/Buna N/LNBR/Viton      | 2    |
| 21   | Stop Nut (Adjusting Screw) | Stainless Steel 300 Series | 2    |
| 22   | Adjusting Screw            | Stainless Steel 300 Series | 2    |
| 23   | Stop Screw                 | Stainless Steel 300 Series | 2    |
| 24   | Nut (Stop Screw)           | Stainless Steel 300 Series | 2    |
| 25   | O-ring (End Cap)           | NBR/Buna N/LNBR/Viton      | 2    |
| 26   | End Cap                    | Die-Cast Aluminum          | 2    |
| 27   | End Cap Screw              | Stainless Steel 300 Series | 8    |
| 28   | Shaft Adapter              | Sintered Metal             | 1    |

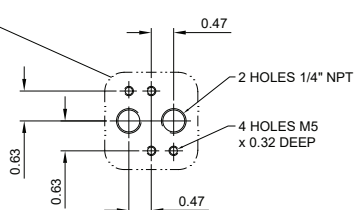
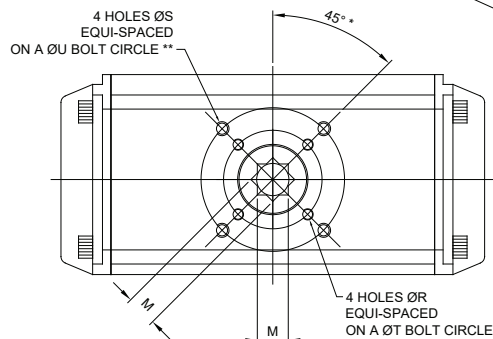
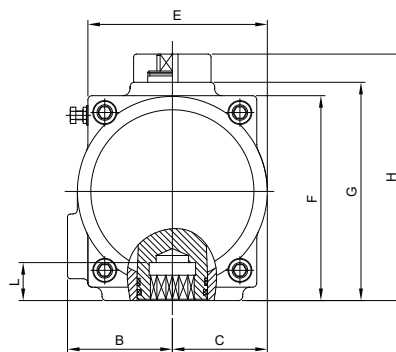
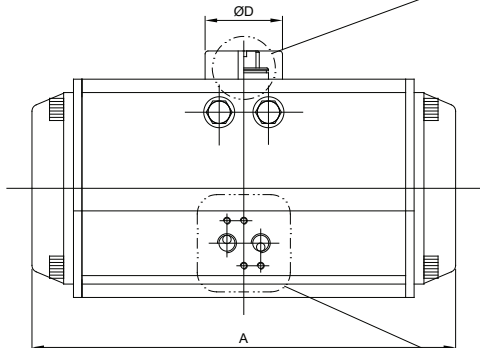
### Alloy Valves and Control

4 HOLES M5 x 0.32 DEEP  
NAMUR PATTERN



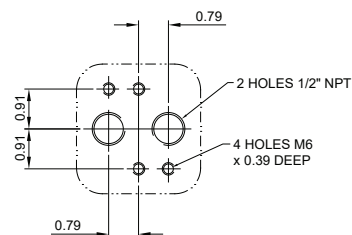
\* This angle is 22.5° for ISO 5211 F25

\*\* Number of holes is 8 for ISO 5211



#### 1/4" NAMUR

ALL MODELS UP TO AND  
INCLUDING CDA/CSR240



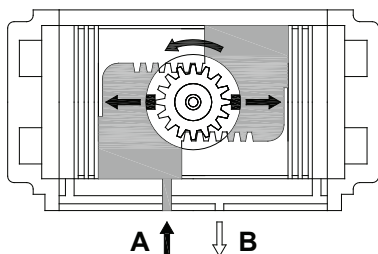
#### 1/2" NAMUR

CDA/CSR270 THRU  
CDA/CSR400

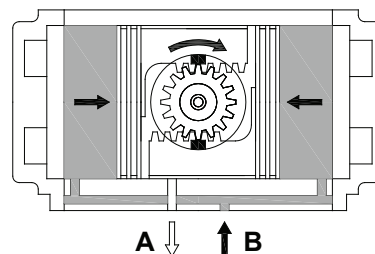
| MODEL      | A<br>(in.) | B<br>(in.) | C<br>(in.) | D<br>(in.) | E<br>(in.) | F<br>(in.) | G<br>(in.) | H<br>(in.) | J<br>(in.) | K<br>(in.) | L<br>(in.) | M<br>(in.) | R<br>(mm) | S<br>(mm) | T<br>(in.) | U<br>(in.) | V<br>(in.) | ISO<br>5211 |
|------------|------------|------------|------------|------------|------------|------------|------------|------------|------------|------------|------------|------------|-----------|-----------|------------|------------|------------|-------------|
| CDA040     | 4.81       | 1.13       | 1.44       | 1.58       | 2.05       | 2.36       |            | 3.15       | 3.15       | 1.18       | 0.55       | 0.433      | M5x8 DP   | M6x10 DP  | 1.417      | 1.969      | 0.79       | F03/F05     |
| CDA/CSR052 | 5.79       | 1.18       | 1.63       | 1.58       | 2.56       | 2.58       | 2.83       | 3.62       | 3.15       | 1.18       | 0.55       | 0.433      | M5x8 DP   | M6x10 DP  | 1.417      | 1.969      | 0.79       | F03/F05     |
| CDA/CSR063 | 6.61       | 1.42       | 1.85       | 1.58       | 2.83       | 3.19       | 3.44       | 4.23       | 3.15       | 1.18       | 0.71       | 0.551      | M6x10 DP  | M8x13 DP  | 1.969      | 2.756      | 0.79       | F05/F07     |
| CDA/CSR075 | 7.24       | 1.65       | 2.09       | 1.58       | 3.19       | 3.70       | 3.92       | 4.70       | 3.15       | 1.18       | 0.71       | 0.551      | M6x10 DP  | M8x13 DP  | 1.969      | 2.756      | 0.79       | F05/F07     |
| CDA/CSR083 | 8.03       | 1.81       | 2.24       | 1.58       | 3.62       | 3.88       | 4.28       | 5.07       | 3.15       | 1.18       | 0.83       | 0.669      | M6x10 DP  | M8x13 DP  | 1.969      | 2.756      | 0.79       | F05/F07     |
| CDA/CSR092 | 10.31      | 1.97       | 2.30       | 1.58       | 3.86       | 4.37       | 4.60       | 5.39       | 3.15       | 1.18       | 0.83       | 0.669      | M6x10 DP  | M8x13 DP  | 1.969      | 2.756      | 0.79       | F05/F07     |
| CDA/CSR105 | 10.55      | 2.26       | 2.52       | 1.58       | 4.31       | 4.82       | 5.24       | 6.02       | 3.15       | 1.18       | 1.02       | 0.866      | M8x13 DP  | M10x16 DP | 2.756      | 4.016      | 0.79       | F07/F10     |
| CDA/CSR125 | 11.85      | 2.66       | 2.93       | 2.17       | 5.02       | 5.73       | 6.10       | 6.89       | 3.15       | 1.18       | 1.02       | 0.866      | M8x13 DP  | M10x16 DP | 2.756      | 4.016      | 0.79       | F07/F10     |
| CDA/CSR140 | 15.35      | 2.95       | 3.03       | 2.17       | 5.41       | 6.33       | 6.75       | 7.54       | 3.15       | 1.18       | 1.22       | 1.063      | M10x16 DP | M12x20 DP | 4.016      | 4.921      | 0.79       | F10/F12     |
| CDA/CSR160 | 18.03      | 3.43       | 3.43       | 2.17       | 6.22       | 7.24       | 7.76       | 8.54       | 3.15       | 1.18       | 1.22       | 1.063      | M10x16 DP | M12x20 DP | 4.016      | 4.921      | 0.79       | F10/F12     |
| CDA/CSR190 | 20.79      | 4.06       | 4.06       | 3.15       | 7.44       | 8.50       | 9.06       | 10.24      | 5.12       | 1.18       | 1.57       | 1.417      | M16x24 DP |           | 5.512      |            | 1.18       | F14         |
| CDA/CSR210 | 20.94      | 4.45       | 4.45       | 3.15       | 8.27       | 9.27       | 10.04      | 11.22      | 5.12       | 1.18       | 1.57       | 1.417      | M16x24 DP |           | 5.512      |            | 1.18       | F14         |
| CDA/CSR240 | 23.70      | 5.12       | 5.12       | 3.15       | 9.65       | 10.39      | 11.38      | 12.56      | 5.12       | 1.18       | 1.97       | 1.811      | M20x25 DP |           | 6.496      |            | 1.18       | F16         |
| CDA/CSR270 | 28.42      | 5.79       | 5.79       | 3.15       | 10.75      | 11.77      | 12.83      | 14.01      | 5.12       | 1.18       | 1.97       | 1.811      | M20x25 DP |           | 6.496      |            | 1.18       | F16         |
| CDA/CSR300 | 29.84      | 7.99       | 7.99       | 3.15       | 15.98      | 12.42      | 13.70      | 14.88      | 5.12       | 1.18       | 2.36       | 1.811      | M20x25 DP | M20x25 DP | 6.496      | 8.465      | 1.18       | F16/-       |
| CDA/CSR350 | 34.97      | 9.06       | 9.06       | 3.15       | 18.12      | 14.50      | 16.06      | 17.25      | 5.12       | 1.18       | 2.36       | 1.811      | M20x25 DP | M16x24 DP | 6.496      | 10.00      | 1.18       | F16/F25     |
| CDA/CSR400 | 36.61      | 10.16      | 10.16      | 3.15       | 20.32      | 17.50      | 18.90      | 20.08      | 5.12       | 1.18       | 2.36       | 2.165      | M20x25 DP | M16x24 DP | 6.496      | 10.00      | 1.18       | F16/F25     |

#### ACTUATOR OPERATION (as viewed from above)

##### Double Acting

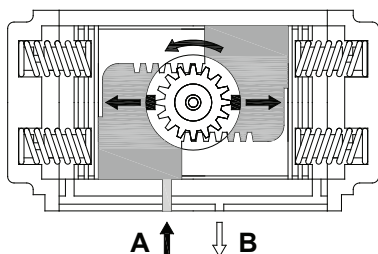


By supplying air to Port A, pressure is applied to the center chamber forcing the pistons outward. Linear piston force is transferred via gear racks to the pinion gear, causing the pinion to rotate counter-clockwise whilst air is exhausted from Port B.

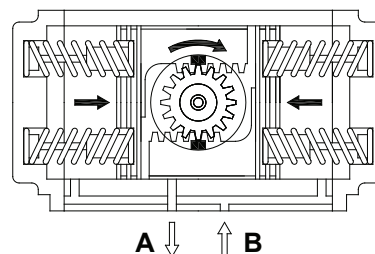


By supplying air to Port B, pressure is applied to the outside chamber and drives the dual pistons inwards, causing the pinion to turn clockwise whilst air is exhausted from Port A.

##### Spring Return (Fail-Safe)



By supplying air to Port A, pressure is applied to the center chamber forcing the pistons outward and compressing the springs in the outside chambers resulting in a counter-clockwise rotation. Exhaust air exits Port B.



Upon loss of air pressure, the stored energy in the compressed springs forces the pistons inwards to give a clockwise rotation with exhaust air exiting Port A. This 'fail-safe' position is held by spring force until air pressure is reapplied to Port A.

#### Spring Return Actuator Torque Output (lbf-in)

|                    |                | OUTPUT AIR TO SPRING |     |       |     |       |     |       |     |       |     |       |     |       |     | SPRING RETURN |     |
|--------------------|----------------|----------------------|-----|-------|-----|-------|-----|-------|-----|-------|-----|-------|-----|-------|-----|---------------|-----|
| AIR PRESSURE (psi) |                | 40                   |     | 50    |     | 60    |     | 70    |     | 80    |     | 90    |     | 100   |     | OUTPUT        |     |
| MODEL No.          | No. of SPRINGS | 0°                   | 90° | 0°    | 90° | 0°    | 90° | 0°    | 90° | 0°    | 90° | 0°    | 90° | 0°    | 90° | 90°           | 0°  |
|                    |                | Start                | End | Start | End | Start | End | Start | End | Start | End | Start | End | Start | End | Start         | End |
| CSR052             | 5              | 55                   | 37  | 77    | 58  |       |     |       |     |       |     |       |     |       |     | 55            | 38  |
|                    | 6              | 48                   | 24  | 70    | 46  | 94    | 78  |       |     |       |     |       |     |       |     | 66            | 45  |
|                    | 7              | 39                   | 13  | 61    | 34  | 90    | 67  | 120   | 89  |       |     |       |     |       |     | 77            | 52  |
|                    | 8              |                      |     | 53    | 20  | 84    | 55  | 113   | 78  | 140   | 114 |       |     |       |     | 87            | 60  |
|                    | 9              |                      |     | 44    | 8   | 76    | 44  | 105   | 67  | 133   | 104 | 160   | 132 |       |     | 98            | 67  |
|                    | 10             |                      |     |       |     | 68    | 33  | 98    | 57  | 126   | 94  | 153   | 122 |       |     | 109           | 75  |
|                    | 11             |                      |     |       |     | 60    | 21  | 91    | 46  | 119   | 84  | 146   | 113 | 172   | 140 | 120           | 82  |
|                    | 12             |                      |     |       |     |       |     | 83    | 36  | 112   | 74  | 139   | 95  | 166   | 130 | 131           | 90  |
| CSR063             | 5              | 111                  | 75  | 153   | 116 | 204   | 137 |       |     |       |     |       |     |       |     | 92            | 61  |
|                    | 6              | 98                   | 55  | 138   | 95  | 191   | 152 | 242   | 205 |       |     |       |     |       |     | 111           | 72  |
|                    | 7              | 84                   | 35  | 127   | 73  | 179   | 133 | 229   | 187 |       |     |       |     |       |     | 129           | 85  |
|                    | 8              |                      |     | 111   | 52  | 167   | 114 | 218   | 169 | 267   | 220 | 315   | 269 |       |     | 148           | 97  |
|                    | 9              |                      |     |       |     | 154   | 95  | 206   | 151 | 255   | 203 | 304   | 253 |       |     | 166           | 109 |
|                    | 10             |                      |     |       |     | 132   | 75  | 195   | 133 | 244   | 186 | 293   | 236 | 341   | 286 | 185           | 121 |
|                    | 11             |                      |     |       |     |       |     | 184   | 115 | 234   | 169 | 283   | 220 | 330   | 270 | 203           | 133 |
|                    | 12             |                      |     |       |     |       |     | 171   | 97  | 222   | 152 | 271   | 204 | 320   | 254 | 222           | 145 |
| CSR075             | 5              | 141                  | 103 | 197   | 158 | 270   | 235 |       |     |       |     |       |     |       |     | 128           | 93  |
|                    | 6              | 121                  | 74  | 176   | 128 | 251   | 208 | 321   | 280 |       |     |       |     |       |     | 154           | 112 |
|                    | 7              | 101                  | 47  | 155   | 99  | 232   | 182 | 303   | 256 |       |     |       |     |       |     | 179           | 131 |
|                    | 8              |                      |     | 133   | 69  | 211   | 155 | 284   | 231 | 352   | 301 | 418   | 369 |       |     | 205           | 149 |
|                    | 9              |                      |     |       |     | 192   | 129 | 266   | 206 | 335   | 278 | 402   | 347 |       |     | 231           | 168 |
|                    | 10             |                      |     |       |     | 174   | 102 | 246   | 181 | 318   | 254 | 386   | 324 | 451   | 391 | 256           | 187 |
|                    | 11             |                      |     |       |     |       |     | 231   | 157 | 301   | 231 | 369   | 301 | 435   | 369 | 282           | 205 |
|                    | 12             |                      |     |       |     |       |     | 213   | 132 | 284   | 207 | 353   | 278 | 419   | 346 | 308           | 224 |
| CSR083             | 5              | 227                  | 157 | 317   | 244 | 428   | 364 |       |     |       |     |       |     |       |     | 204           | 140 |
|                    | 6              | 196                  | 112 | 285   | 196 | 400   | 321 | 508   | 434 |       |     |       |     |       |     | 244           | 168 |
|                    | 7              | 166                  | 67  | 252   | 151 | 371   | 279 | 481   | 395 |       |     |       |     |       |     | 285           | 196 |
|                    | 8              |                      |     | 221   | 103 | 342   | 237 | 454   | 355 | 560   | 466 | 663   | 572 |       |     | 326           | 224 |
|                    | 9              |                      |     |       |     | 313   | 192 | 426   | 316 | 534   | 429 | 638   | 536 |       |     | 367           | 252 |
|                    | 10             |                      |     |       |     | 284   | 152 | 400   | 276 | 508   | 391 | 613   | 500 | 715   | 605 | 407           | 280 |
|                    | 11             |                      |     |       |     |       |     | 373   | 237 | 483   | 353 | 588   | 464 | 691   | 570 | 448           | 308 |
|                    | 12             |                      |     |       |     |       |     | 345   | 198 | 456   | 316 | 563   | 428 | 667   | 536 | 489           | 336 |
| CSR092             | 5              | 322                  | 214 | 450   | 338 | 612   | 511 |       |     |       |     |       |     |       |     | 304           | 207 |
|                    | 6              | 277                  | 148 | 403   | 269 | 569   | 449 | 725   | 612 |       |     |       |     |       |     | 365           | 248 |
|                    | 7              | 231                  | 80  | 355   | 197 | 526   | 385 | 685   | 553 |       |     |       |     |       |     | 426           | 289 |
|                    | 8              |                      |     | 319   | 128 | 484   | 323 | 646   | 495 | 799   | 655 | 947   | 808 |       |     | 487           | 331 |
|                    | 9              |                      |     |       |     | 441   | 260 | 606   | 436 | 761   | 599 | 911   | 755 |       |     | 548           | 372 |
|                    | 10             |                      |     |       |     | 399   | 197 | 566   | 377 | 723   | 543 | 874   | 700 | 1022  | 853 | 608           | 413 |
|                    | 11             |                      |     |       |     |       |     | 525   | 318 | 685   | 487 | 837   | 647 | 986   | 801 | 669           | 454 |
|                    | 12             |                      |     |       |     |       |     | 486   | 260 | 647   | 432 | 800   | 593 | 950   | 749 | 730           | 496 |



#### Spring Return Actuator Torque Output (lbf-in) (Continued)

|                    |                | OUTPUT AIR TO SPRING |      |       |      |       |      |       |      |       |      |       |      |       |      | SPRING RETURN |      |
|--------------------|----------------|----------------------|------|-------|------|-------|------|-------|------|-------|------|-------|------|-------|------|---------------|------|
| AIR PRESSURE (psi) |                | 40                   |      | 50    |      | 60    |      | 70    |      | 80    |      | 90    |      | 100   |      | OUTPUT        |      |
| MODEL No.          | No. of SPRINGS | 0°                   | 90°  | 0°    | 90°  | 0°    | 90°  | 0°    | 90°  | 0°    | 90°  | 0°    | 90°  | 0°    | 90°  | 90°           | 0°   |
|                    |                | Start                | End  | Start | End  | Start | End  | Start | End  | Start | End  | Start | End  | Start | End  | Start         | End  |
| CSR105             | 5              | 497                  | 325  | 687   | 508  | 921   | 760  |       |      |       |      |       |      |       |      | 436           | 280  |
|                    | 6              | 435                  | 229  | 622   | 407  | 862   | 670  | 1088  | 908  |       |      |       |      |       |      | 523           | 336  |
|                    | 7              | 374                  | 133  | 559   | 308  | 805   | 580  | 1035  | 824  |       |      |       |      |       |      | 610           | 392  |
|                    | 8              |                      |      | 494   | 208  | 747   | 490  | 980   | 740  | 1203  | 974  | 1419  | 1198 |       |      | 697           | 448  |
|                    | 9              |                      |      |       |      | 689   | 400  | 927   | 656  | 1152  | 894  | 1370  | 1122 |       |      | 784           | 504  |
|                    | 10             |                      |      |       |      | 631   | 306  | 872   | 569  | 1100  | 811  | 1320  | 1041 | 1535  | 1264 | 871           | 560  |
|                    | 11             |                      |      |       |      |       |      | 818   | 487  | 1048  | 733  | 1270  | 966  | 1486  | 1191 | 958           | 616  |
|                    | 12             |                      |      |       |      |       |      | 764   | 406  | 997   | 656  | 1221  | 892  | 1439  | 1119 | 1045          | 672  |
| CSR125             | 5              | 712                  | 453  | 1000  | 729  | 1358  | 1115 |       |      |       |      |       |      |       |      | 698           | 462  |
|                    | 6              | 610                  | 305  | 893   | 574  | 1263  | 976  | 1608  | 1340 |       |      |       |      |       |      | 832           | 555  |
|                    | 7              | 509                  | 148  | 787   | 410  | 1167  | 828  | 1519  | 1202 |       |      |       |      |       |      | 971           | 647  |
|                    | 8              |                      |      | 681   | 255  | 1071  | 689  | 1429  | 1072 | 1770  | 1429 | 2100  | 1772 |       |      | 1110          | 740  |
|                    | 9              |                      |      |       |      | 976   | 541  | 1340  | 934  | 1685  | 1298 | 2018  | 1645 |       |      | 1249          | 832  |
|                    | 10             |                      |      |       |      | 880   | 402  | 1251  | 804  | 1600  | 1174 | 1936  | 1526 | 2264  | 1865 | 1387          | 925  |
|                    | 11             |                      |      |       |      |       |      | 1161  | 666  | 1514  | 1043 | 1854  | 1399 | 2184  | 1742 | 1530          | 1017 |
|                    | 12             |                      |      |       |      |       |      | 1072  | 536  | 1429  | 919  | 1772  | 1280 | 2105  | 1626 | 1665          | 1110 |
| CSR140             | 5              | 1246                 | 823  | 1737  | 1296 | 2346  | 1948 |       |      |       |      |       |      |       |      | 1143          | 759  |
|                    | 6              | 1082                 | 573  | 1566  | 1035 | 2192  | 1713 | 2778  | 2331 |       |      |       |      |       |      | 1370          | 908  |
|                    | 7              | 916                  | 324  | 1392  | 773  | 2035  | 1478 | 2631  | 2112 |       |      |       |      |       |      | 1598          | 1059 |
|                    | 8              |                      |      | 1218  | 512  | 1878  | 1244 | 2485  | 1892 | 3063  | 2498 | 3624  | 3080 |       |      | 1826          | 1211 |
|                    | 9              |                      |      |       |      | 1713  | 1009 | 2331  | 1673 | 2916  | 2290 | 3483  | 2879 |       |      | 2054          | 1370 |
|                    | 10             |                      |      |       |      | 1557  | 765  | 2185  | 1446 | 2777  | 2073 | 3348  | 2670 | 3906  | 3247 | 2283          | 1522 |
|                    | 11             |                      |      |       |      |       |      | 2039  | 1226 | 2638  | 1864 | 3214  | 2468 | 3776  | 3051 | 2510          | 1673 |
|                    | 12             |                      |      |       |      |       |      | 1892  | 1007 | 2498  | 1655 | 3080  | 2267 | 3645  | 2855 | 2741          | 1824 |
| CSR160             | 5              | 1877                 | 1212 | 2640  | 1943 | 3592  | 2966 |       |      |       |      |       |      |       |      | 1844          | 1236 |
|                    | 6              | 1609                 | 805  | 2359  | 1518 | 3340  | 2583 | 4256  | 3549 |       |      |       |      |       |      | 2212          | 1483 |
|                    | 7              | 1332                 | 398  | 2069  | 1093 | 3079  | 2200 | 4012  | 3192 |       |      |       |      |       |      | 2581          | 1730 |
|                    | 8              |                      |      | 1789  | 667  | 2826  | 1818 | 3777  | 2022 | 4680  | 3782 | 5556  | 4691 |       |      | 2949          | 1977 |
|                    | 9              |                      |      |       |      | 2566  | 1435 | 3533  | 2477 | 4448  | 3442 | 5332  | 4363 |       |      | 3321          | 2225 |
|                    | 10             |                      |      |       |      | 2313  | 1052 | 3297  | 2120 | 4223  | 3102 | 5116  | 4034 | 5986  | 4935 | 3691          | 2472 |
|                    | 11             |                      |      |       |      |       |      | 3062  | 1771 | 3999  | 2769 | 4900  | 3714 | 5776  | 4624 | 4056          | 2719 |
|                    | 12             |                      |      |       |      |       |      | 2818  | 1413 | 3767  | 2429 | 4676  | 3386 | 5559  | 4305 | 4422          | 2966 |
| CSR190             | 5              | 3228                 | 2164 | 4457  | 3345 | 5957  | 4957 |       |      |       |      |       |      |       |      | 2737          | 1774 |
|                    | 6              | 2839                 | 1563 | 4051  | 2717 | 5592  | 4392 | 7041  | 5921 |       |      |       |      |       |      | 3287          | 2127 |
|                    | 7              | 2451                 | 962  | 3645  | 2088 | 5227  | 3827 | 6700  | 5393 |       |      |       |      |       |      | 3834          | 2480 |
|                    | 8              |                      |      | 3239  | 1460 | 4861  | 3261 | 6359  | 4865 | 7789  | 6366 | 9180  | 7808 |       |      | 4380          | 2833 |
|                    | 9              |                      |      |       |      | 4496  | 2696 | 6018  | 4337 | 7464  | 5863 | 8867  | 7323 |       |      | 4927          | 3186 |
|                    | 10             |                      |      |       |      | 4131  | 2131 | 5677  | 3809 | 7139  | 5360 | 8554  | 6838 | 9936  | 8269 | 5473          | 3540 |
|                    | 11             |                      |      |       |      |       |      | 5336  | 3281 | 6814  | 4858 | 8240  | 6354 | 9632  | 7798 | 6020          | 3893 |
|                    | 12             |                      |      |       |      |       |      | 4995  | 2753 | 6490  | 4355 | 7927  | 5869 | 9327  | 7327 | 6566          | 4246 |

#### Spring Return Actuator Torque Output (lbf-in) (Continued)

|                    |                | OUTPUT AIR TO SPRING |      |       |       |       |       |       |       |       |       |       |       |       |       | SPRING RETURN |       |
|--------------------|----------------|----------------------|------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|---------------|-------|
| AIR PRESSURE (psi) |                | 40                   |      | 50    |       | 60    |       | 70    |       | 80    |       | 90    |       | 100   |       | OUTPUT        |       |
| MODEL No.          | No. of SPRINGS | 0°                   | 90°  | 0°    | 90°   | 0°    | 90°   | 0°    | 90°   | 0°    | 90°   | 0°    | 90°   | 0°    | 90°   | 90°           | 0°    |
|                    |                | Start                | End  | Start | End   | Start | End   | Start | End   | Start | End   | Start | End   | Start | End   | Start         | End   |
| CSR210             | 5              | 3801                 | 2774 | 5327  | 4254  | 7227  | 6262  |       |       |       |       |       |       |       |       | 3363          | 2430  |
|                    | 6              | 3265                 | 2035 | 4767  | 3481  | 6723  | 5566  | 8552  | 7472  |       |       |       |       |       |       | 4036          | 2917  |
|                    | 7              | 2728                 | 1295 | 4206  | 2707  | 6218  | 4870  | 8081  | 6822  |       |       |       |       |       |       | 4708          | 3405  |
|                    | 8              |                      |      | 3645  | 1934  | 5714  | 4174  | 7610  | 6172  | 9413  | 8044  | 11164 | 9844  |       |       | 5381          | 3893  |
|                    | 9              |                      |      |       |       | 5209  | 3479  | 7139  | 5523  | 8965  | 7426  | 10731 | 9247  |       |       | 6053          | 4380  |
|                    | 10             |                      |      |       |       | 4705  | 2783  | 6668  | 4873  | 8516  | 6807  | 10299 | 8651  | 12038 | 10436 | 6726          | 4868  |
|                    | 11             |                      |      |       |       |       |       | 6197  | 4223  | 8068  | 6188  | 9866  | 8054  | 11617 | 9856  | 7399          | 5356  |
|                    | 12             |                      |      |       |       |       |       | 5726  | 3574  | 7619  | 5569  | 9434  | 7457  | 11197 | 9276  | 8071          | 5843  |
| CSR240             | 5              | 5373                 | 3977 | 7571  | 6111  | 10332 | 9018  |       |       |       |       |       |       |       |       | 4902          | 3632  |
|                    | 6              | 4578                 | 2895 | 6739  | 4979  | 9584  | 8001  | 12239 | 10761 |       |       |       |       |       |       | 5885          | 4355  |
|                    | 7              | 3773                 | 1822 | 5898  | 3858  | 8827  | 6992  | 11533 | 9819  |       |       |       |       |       |       | 6861          | 5087  |
|                    | 8              |                      |      | 5066  | 2727  | 8079  | 5975  | 10834 | 8869  | 13451 | 11579 | 15989 | 14184 |       |       | 7844          | 5810  |
|                    | 9              |                      |      |       |       | 7323  | 4957  | 10128 | 7919  | 12778 | 10674 | 15340 | 13312 |       |       | 8828          | 6541  |
|                    | 10             |                      |      |       |       | 6575  | 3948  | 9429  | 6976  | 12113 | 9777  | 14699 | 12446 | 17220 | 15031 | 9803          | 7264  |
|                    | 11             |                      |      |       |       |       |       | 8731  | 6026  | 11448 | 8872  | 14057 | 11574 | 16596 | 14183 | 10787         | 7987  |
|                    | 12             |                      |      |       |       |       |       | 8024  | 5076  | 10775 | 7967  | 13408 | 10701 | 15966 | 13335 | 11771         | 8719  |
| CSR270             | 5              | 8786                 | 6576 | 12163 | 9852  | 16289 | 14210 |       |       |       |       |       |       |       |       | 6961          | 4952  |
|                    | 6              | 7695                 | 5050 | 11022 | 8257  | 15263 | 12775 | 19256 | 16934 |       |       |       |       |       |       | 8349          | 5944  |
|                    | 7              | 6612                 | 3514 | 9891  | 6652  | 14245 | 11332 | 18306 | 15585 |       |       |       |       |       |       | 9744          | 6928  |
|                    | 8              |                      |      | 8750  | 5057  | 13219 | 9897  | 17348 | 14245 | 21286 | 18332 | 25109 | 22260 |       |       | 11132         | 7920  |
|                    | 9              |                      |      |       |       | 12193 | 8453  | 16389 | 12897 | 20374 | 17048 | 24229 | 21023 |       |       | 12527         | 8912  |
|                    | 10             |                      |      |       |       | 11167 | 7018  | 15431 | 11557 | 19461 | 15771 | 23349 | 19792 | 27156 | 23699 | 13914         | 9904  |
|                    | 11             |                      |      |       |       |       |       | 14473 | 10209 | 18548 | 14487 | 22469 | 18554 | 26300 | 22496 | 15310         | 10896 |
|                    | 12             |                      |      |       |       |       |       | 13523 | 8869  | 17643 | 13211 | 21597 | 17324 | 25452 | 21300 | 16697         | 11880 |
| CSR300             | 5              | 9709                 | 6452 |       |       |       |       |       |       |       |       |       |       |       |       | 9391          | 6461  |
|                    | 6              | 8275                 | 4372 | 12230 | 8131  |       |       |       |       |       |       |       |       |       |       | 11267         | 7753  |
|                    | 7              | 6833                 | 2283 | 10715 | 5939  | 16958 | 12409 |       |       |       |       |       |       |       |       | 13143         | 9045  |
|                    | 8              |                      |      | 9210  | 3745  | 15524 | 10320 | 18156 | 13914 | 22277 | 17073 |       |       |       |       | 15020         | 10338 |
|                    | 9              |                      |      |       |       | 14090 | 8831  | 16988 | 12212 | 20844 | 14984 | 27597 | 21737 |       |       | 16896         | 11630 |
|                    | 10             |                      |      |       |       | 12657 | 6151  | 15819 | 10517 | 19410 | 12904 | 26163 | 19658 | 31270 | 25090 | 18781         | 12922 |
|                    | 11             |                      |      |       |       |       |       | 14643 | 8815  | 17967 | 10816 | 24720 | 17569 | 29899 | 23106 | 20658         | 14214 |
|                    | 12             |                      |      |       |       |       |       | 13474 | 7113  | 16533 | 8727  | 23286 | 15480 | 28537 | 21121 | 22574         | 24924 |
| CSR350             | 5              | 13745                | 8532 |       |       |       |       |       |       |       |       |       |       |       |       | 15064         | 10382 |
|                    | 6              | 11435                | 5787 | 17313 | 10752 | 24285 | 17011 |       |       |       |       |       |       |       |       | 18082         | 12462 |
|                    | 7              | 9125                 | 1841 | 14888 | 7240  | 21985 | 13666 |       |       |       |       |       |       |       |       | 21091         | 14533 |
|                    | 8              |                      |      | 12462 | 3726  | 19684 | 10311 | 26156 | 19375 | 32093 | 23773 |       |       |       |       | 24109         | 16613 |
|                    | 9              |                      |      |       |       | 17374 | 6966  | 24280 | 16641 | 29792 | 20419 | 39899 | 30526 |       |       | 27119         | 18693 |
|                    | 10             |                      |      |       |       |       |       | 22398 | 13914 | 27842 | 17073 | 37589 | 27181 | 45321 | 35432 | 30137         | 20764 |
|                    | 11             |                      |      |       |       |       |       | 20515 | 11188 | 25172 | 13728 | 35279 | 23835 | 43125 | 32253 | 33146         | 22844 |
|                    | 12             |                      |      |       |       |       |       | 18639 | 8454  | 22870 | 10373 | 32978 | 20481 | 40939 | 29067 | 36164         | 24924 |



#### Spring Return Actuator Torque Output (lbf-in) (Continued)

|                    |                | OUTPUT AIR TO SPRING |      |       |       |       |       |       |       |       |       |       |       |       |       | SPRING RETURN |       |
|--------------------|----------------|----------------------|------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|---------------|-------|
| AIR PRESSURE (psi) |                | 40                   |      | 50    |       | 60    |       | 70    |       | 80    |       | 90    |       | 100   |       | OUTPUT        |       |
| MODEL No.          | No. of SPRINGS | 0°                   | 90°  | 0°    | 90°   | 0°    | 90°   | 0°    | 90°   | 0°    | 90°   | 0°    | 90°   | 0°    | 90°   | 90°           | 0°    |
|                    |                | Start                | End  | Start | End   | Start | End   | Start | End   | Start | End   | Start | End   | Start | End   | Start         | End   |
| CSR400             | 7              | 17949                | 7691 |       |       |       |       |       |       |       |       |       |       |       |       | 25496         | 16259 |
|                    | 8              | 15365                | 3638 | 23697 | 11384 |       |       |       |       |       |       |       |       |       |       | 29137         | 18587 |
|                    | 9              |                      |      | 20994 | 7137  | 34403 | 21206 |       |       |       |       |       |       |       |       | 32774         | 20905 |
|                    | 10             |                      |      | 18279 | 2891  | 31818 | 17162 | 37675 | 25730 | 46227 | 31571 |       |       |       |       | 36421         | 23224 |
|                    | 11             |                      |      |       |       | 29234 | 13117 | 35569 | 22434 | 43643 | 27526 | 58052 | 41935 |       |       | 40058         | 25552 |
|                    | 12             |                      |      |       |       | 26658 | 9072  | 33470 | 19137 | 41067 | 23481 | 55477 | 37890 | 66383 | 49676 | 43705         | 27871 |
|                    | 13             |                      |      |       |       |       |       | 31364 | 15833 | 38483 | 19427 | 52892 | 33836 | 63927 | 45825 | 47343         | 30199 |
|                    | 14             |                      |      |       |       |       |       | 29264 | 12537 | 35907 | 15383 | 50317 | 29792 | 61481 | 41982 | 50489         | 32518 |
|                    | 15             |                      |      |       |       |       |       | 27158 | 9240  | 33323 | 11338 | 47732 | 25797 | 59025 | 38140 | 54627         | 34845 |
|                    | 16             |                      |      |       |       |       |       |       |       |       |       | 45148 | 21702 | 56571 | 34297 | 58273         | 37164 |

#### Operating Conditions

##### Operating Media

Dry and lubricated air or non-corrosive gas.  
Maximum particle size to be less than 30 µm.

##### Air Supply Pressure

Minimum supply pressure is 35 psig  
Maximum supply pressure is 150 psig

##### Operating Temperature

Standard (NBR/Buna N O-ring): -4 °F to 175 °F  
Low temperature (LNBR O-ring): -30 °F to 175 °F  
High temperature (Viton O-ring): 5 °F to 300 °F

##### Stroke Adjustment

±5° from 0° & 90° position

##### Location

Indoor and outdoor

#### Interface Specification

##### Main Drive Interface (Bottom)

Meets ISO 5211 for direct mount to suitable a valve or connection with standardized mounting hardware.

##### Secondary Drive Interface (Top)

Meets NAMUR specification for direct installation of accessories such as a limit switch or positioner.

##### Air Supply Connection (Side)

Meets NAMUR specification for direct mount of suitable solenoid valves.

### Double Acting Actuator Torque (lbf-in)

| MODEL  | AIR PRESSURE (psig) |       |       |       |       |       |       |        |        |
|--------|---------------------|-------|-------|-------|-------|-------|-------|--------|--------|
|        | 40                  | 50    | 60    | 70    | 80    | 90    | 100   | 110    | 120    |
| CDA040 | 55                  | 71    | 85    | 100   | 115   | 129   | 142   | 157    | 171    |
| CDA052 | 97                  | 122   | 146   | 171   | 195   | 219   | 244   | 268    | 292    |
| CDA063 | 178                 | 223   | 267   | 313   | 356   | 401   | 446   | 490    | 535    |
| CDA075 | 245                 | 306   | 368   | 430   | 490   | 551   | 613   | 674    | 735    |
| CDA083 | 383                 | 476   | 574   | 671   | 766   | 861   | 957   | 1053   | 1149   |
| CDA092 | 551                 | 689   | 827   | 967   | 1103  | 1240  | 1378  | 1516   | 1654   |
| CDA105 | 808                 | 1009  | 1211  | 1416  | 1615  | 1817  | 2019  | 2221   | 2423   |
| CDA125 | 1225                | 1532  | 1833  | 2149  | 2450  | 2757  | 3063  | 3369   | 3676   |
| CDA140 | 2088                | 2611  | 3133  | 3662  | 4177  | 4699  | 5221  | 5743   | 6265   |
| CDA160 | 3249                | 4061  | 4873  | 5697  | 6497  | 7309  | 8122  | 8934   | 9746   |
| CDA190 | 5198                | 6497  | 7797  | 9115  | 10396 | 11695 | 12995 | 14294  | 15594  |
| CDA210 | 6497                | 8122  | 9746  | 11394 | 12995 | 14619 | 16243 | 17868  | 19492  |
| CDA240 | 9398                | 11753 | 14097 | 16480 | 18796 | 21151 | 23495 | 25850  | 28194  |
| CDA270 | 14282               | 17856 | 21430 | 25046 | 28565 | 32139 | 35712 | 39286  | 42859  |
| CDA300 | 16887               | 21270 | 27012 | 30393 | 33766 | 40519 | 44900 | 49390  | 54020  |
| CDA350 | 25278               | 31840 | 40448 | 45502 | 50555 | 60663 | 67240 | 73960  | 80880  |
| CDA400 | 36014               | 45375 | 57627 | 64832 | 72036 | 86445 | 95800 | 105380 | 115250 |

### Weight (lbs)

| MODEL | 040 | 052 | 063 | 075 | 083 | 092 | 105 | 125 | 140 | 160 | 190 | 210 | 240 | 270 | 300 | 350 | 400 |
|-------|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|
| CDA   | 2   | 3   | 4   | 6   | 7   | 10  | 13  | 19  | 29  | 44  | 72  | 87  | 122 | 184 | 283 | 462 | 616 |
| CSR   | N/A | 3   | 4   | 6   | 8   | 12  | 15  | 23  | 35  | 53  | 87  | 108 | 152 | 235 | 343 | 571 | 792 |

### Maximum Air Consumption Per Stroke (cubic inches)

| MODEL/<br>ACTION | 040 | 052 | 063  | 075  | 083  | 092  | 105  | 125  | 140   | 160   | 190   | 210   | 240   | 270    | 300    | 350  | 400  |
|------------------|-----|-----|------|------|------|------|------|------|-------|-------|-------|-------|-------|--------|--------|------|------|
| CCW              | 5.0 | 7.3 | 12.9 | 18.3 | 26.2 | 39.1 | 58.0 | 97.6 | 152.5 | 225.7 | 359.9 | 457.5 | 671.2 | 1037.5 | 1811.7 | 2824 | 3416 |
| CW               | 6.9 | 9.7 | 14.1 | 20.7 | 28.7 | 44.6 | 53.7 | 85.4 | 134.2 | 195.2 | 329.4 | 457.5 | 549.3 | 854.4  | 1451.8 | 2141 | 3208 |

### Actuator Cycle Speed (seconds)

| ACTION | MODEL | 040 | 052 | 063 | 075 | 083 | 092 | 105 | 125 | 140 | 160 | 190 | 210 | 240  | 270  | 300  | 350  | 400  |
|--------|-------|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|------|------|------|------|------|
| CCW    | DA    | 0.3 | 0.6 | 0.7 | 0.8 | 0.9 | 1.0 | 1.5 | 2.0 | 2.5 | 4.0 | 5.0 | 5.0 | 6.0  | 8.0  | 12.0 | 14.0 | 15.0 |
|        | SR    | N/A | 2.5 | 2.6 | 2.7 | 2.7 | 3.8 | 3.9 | 4.3 | 4.7 | 4.8 | 5.8 | 8.5 | 17.0 | 18.0 | 25.0 | 31.0 | 52.0 |
| CW     | DA    | 0.3 | 0.5 | 0.7 | 0.7 | 0.8 | 1.0 | 1.5 | 2.0 | 2.5 | 3.0 | 4.0 | 4.5 | 6.0  | 8.0  | 12.0 | 14.0 | 15.0 |
|        | SR    | N/A | 0.4 | 0.5 | 0.6 | 0.7 | 0.8 | 0.9 | 1.1 | 1.3 | 1.7 | 3.5 | 4.5 | 5.0  | 6.2  | 13.0 | 17.0 | 27.0 |

### ACTUATOR SIZING GUIDE

#### Double Acting Actuators

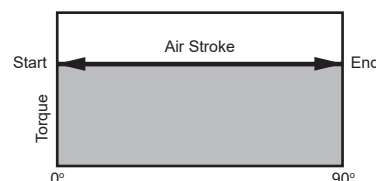
The output torque of a double acting actuator is constant in both clockwise and counter-clockwise rotation. The actuator should be sized as follows:

- Obtain the published maximum valve torque.
- Add a safety factor (margin) to the published torque to give the final torque requirement. We suggest a safety factor in normal operating conditions of at least 20%.
- Determine the required or available air pressure.
- Refer to the double acting actuator torque table in this literature and work down the appropriate air pressure column until you see a torque which just exceeds the final torque requirement.
- Work across the torque output row to find the actuator model number.

#### Example

- A published seating/unseating torque for an 8" high performance butterfly valve is 2600 lbf-in and the hydrodynamic torque for a 2 psi pressure drop is 500 lbf-in. Therefore the maximum valve torque is  $2600 + 500 = 3100$  lbf-in.
- Applying a safety factor of 20% equals  $3100 + (3100 \times 20/100) = 3720$  lbf-in. final torque requirement.
- The available air pressure is 80 psig.
- Therefore the first torque that just exceeds the final torque requirement of 3720 lbf-in is 4177 lbf-in.
- The actuator model meeting 4177 lbf-in @ 80 psig is a CDA140.

DOUBLE ACTING TORQUE CURVE

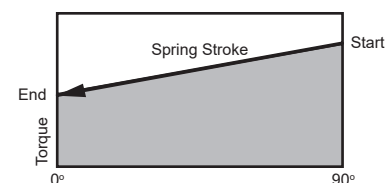
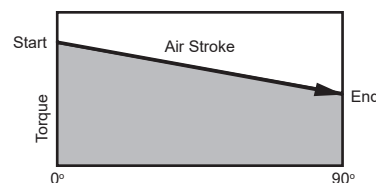


#### Spring Return Actuators

The output torque of a spring return actuator is determined by two factors - air stroke and spring stroke. Each clockwise or counter-clockwise stroke gives different torque values at start and end, four in total, as shown in the figures to the left. These four values are used for sizing the actuator.

- Obtain the published maximum valve torque.
- Add a safety factor (margin) to the published torque to give the final torque requirement. We suggest a safety factor in normal operating conditions of at least 10%.
- Determine the required or available air pressure.
- Refer to the spring actuator torque table in this literature and work down the appropriate air pressure column until you see a torque which just exceeds the final torque requirement in the 'END' column.
- Move across to the spring return 'END' column and check that this value also exceeds the final torque requirement. Both values must exceed the final torque requirement.
- Working left from this point determine the actuator model and number of springs.

SPRING RETURN TORQUE CURVES



#### Example

- A published seating/unseating torque for a 2" ball valve in full differential pressure is 400 lbf-in.
- Applying a safety factor of 10% equals  $400 + (400 \times 10/100) = 440$  lbf-in. final torque requirement.
- The available air pressure is 80 psig.
- Therefore the first torque that just exceeds the final torque requirement of 440 lbf-in is 487 lbf-in. (air end) @ 80 psig and 454 lbf-in (spring end).
- The actuator model meeting this requirement is a CSR092 with 11 springs



**Indirect Mount**



**Direct Mount**



**Compatible with Most  
Accessories via Direct or  
Indirect Mount**

### HOW TO ORDER

| CDA                 | 092            | -                                      | -                  | -                            |
|---------------------|----------------|----------------------------------------|--------------------|------------------------------|
| Series              | Size           | Number of Springs<br>(CSR Models only) | Seals              | Options<br>(CSR Models only) |
| CDA - Double Acting | 040 (CDA Only) | Blank - max springs *                  | Blank - NBR/Buna N | Blank - Fail Clockwise       |
| CSR - Spring Return | 052            | 15 - 15 springs **                     | L - LNBR           | R - Fail Counter-Clockwise   |
|                     | 063            | 14 - 14 springs **                     | V - Viton          | FA - Fast Acting             |
|                     | 075            | 13 - 13 springs **                     |                    |                              |
|                     | 083            | 12 - 12 springs                        |                    |                              |
|                     | 092            | 11 - 11 springs                        |                    |                              |
|                     | 105            | 10 - 10 springs                        |                    |                              |
|                     | 125            | 9 - 9 springs                          |                    |                              |
|                     | 140            | 8 - 8 springs                          |                    |                              |
|                     | 160            | 7 - 7 springs                          |                    |                              |
|                     | 190            | 6 - 6 springs ***                      |                    |                              |
|                     | 210            | 5 - 5 springs ***                      |                    |                              |
|                     | 240            |                                        |                    |                              |
|                     | 270            |                                        |                    |                              |
|                     | 300            |                                        |                    |                              |
|                     | 350            |                                        |                    |                              |
|                     | 400            |                                        |                    |                              |

\* All sizes have 12 springs max as standard except for the CSR400 which has 16 springs max.

\*\* Only available on the CSR400.

\*\*\* Not available on the CSR400.

#### Example ordering codes:

CDA092 = 092 double acting pneumatic actuator with NBR/Buna N seals

CSR083 = 083 spring return fail clockwise pneumatic actuator with NBR/Buna N seals & 12 springs

CSR083-10-L-FO-FA = 083 fast acting spring return fail counter-clockwise pneumatic actuator with LNBR seals & 10 springs