# ALLTORQUE ®

## How to order

| ACTUATOR MODEL | ACTUATION TYPE | SPRING CODE | WORKING TEMPERTURE | COATING |
|---|---|---|---|---|
| X40 | DA=Double Acting | 01 , 02 | P= Normal temp. (-4 ℉ to 176 ℉ -20℃ to 80℃ ) | N=C2-02 |
| X50 | SR=Spring Return | 03 , 04 | P1=High temp. ( -4° F to 250° F -20℃ to 120℃ ) | D=C2-03 |
| X60 | DS=Double Acting with SR Cover | 05 , 06 | P2= Low temp. ( -40° F to 176° F -40℃ to 80℃ ) | E=C3-03 |
| X75 | | 07 , 08 | | F=C4-03 |
| X90 | | 09 , 10 | | G=C5-03 |
| X115 | | | | |

X40　SR　01　P　N

## Coating Specification

| D–F COATING SPECIFICATION | | | | | |
|---|---|---|---|---|---|
| GRADE | BASE | MIDDLE | TOP | DRY FILM THICKNESS | PROTECTION PERIOD |
| C2-02 | Priming coating*1 | - | Finishing coating*1 | 120μm | 5-15 years |
| C2-03 | Priming coating*1 | Anti-corrosion coating*1 | Finishing coating*1 | 160μm | over 15 years |
| C3-03 | Priming coating*1 | Anti-corrosion coating*1 | Finishing coating*2 | 200μm | over 15 years |
| C4-03 | Priming coating*1 | Anti-corrosion coating*1 | Finishing coating*2 | 280μm | over 15 years |
| C5-03 | Priming coating*1 | Anti-corrosion coating*1 | Finishing coating*3 | 320μm | over 15 years |

# THERE ARE BIG ADVANTAGES TO THINKING SMALL

## WHY SMALLER IS BETTER

The All Torque Pneumatic Actuator Series 4x4 packs more than double the torque of conventional rack and pinion actuators. That is because it has four pistons generating torque around a centrally located pinion. With more pistons in the actuator, it allows their diameter to be smaller while generating higher torque. At the same time, it means the size of the actuator can be more compact.

## WHY SMALLER IS BETTER

With four small cylinders each located on one of four sides of the unit and at a given air pressure, the 4x4 produces the same torque output as double piston models using smaller diameter pistons and a narrower pinion. Thanks to the narrower pinion, the pistons travel shorter distances so that they can move faster from one position to the next.

## WHY SMALLER REDUCES AIR CONSUMPTION

The cube shape coupled with pistons traveling shorter distances minimizes size requirements while maximizing torque output. At the same time, shorter piston travel and compact size greatly reduces pressure requirements compared to other designs and results in reduced energy expenditures.

## WHY SMALLER IS A BETTER SOLUTION

Because of the four-cylinder design, the 4x4 has many more spring combination possibilities than double piston actuators. This means better solutions under any air pressure requirement. Each chamber can use up to three different spring sizes which nest between the covers and pistons and align by centering rings. Also, springs are wound in opposite directions to avoid tangles during operation.

## WHY SMALLER IS STRONGER

For superior corrosion resistance, the body and covers are anodized internally and externally.
Plus, they have an external epoxy base layer and a second polyurethane paint to further reduce corrosion in demanding applications. Extended spray wash downs do not create corrosion problems for the actuator.
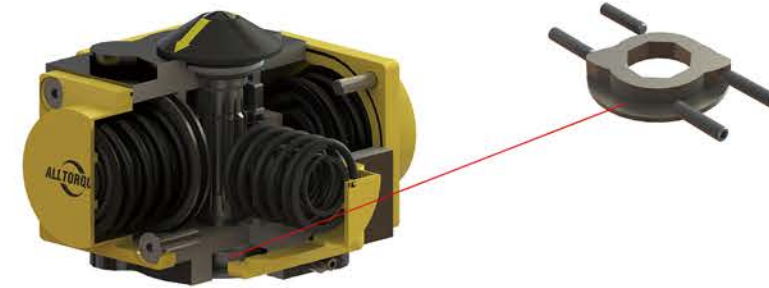
Travel stops can be adjusted by four studs at the base of the actuator. The studs are opposed from each other so no unequal forces are generated, the stop design allows for -/+ 5° adjustment in both opening and closing rotations. Mid-stroke stop points can be achieved with longer studs.

Blowout proof and POM support pad in body maintains proper contact of the piston racks to the pinion at all times
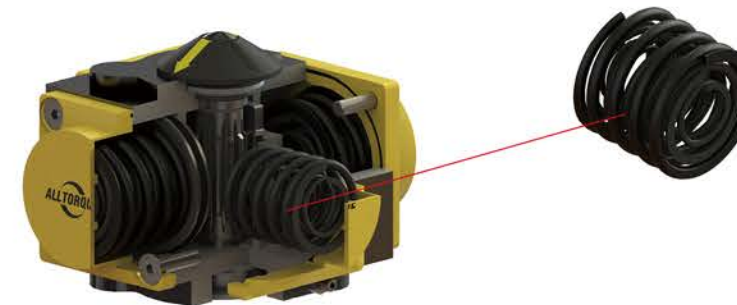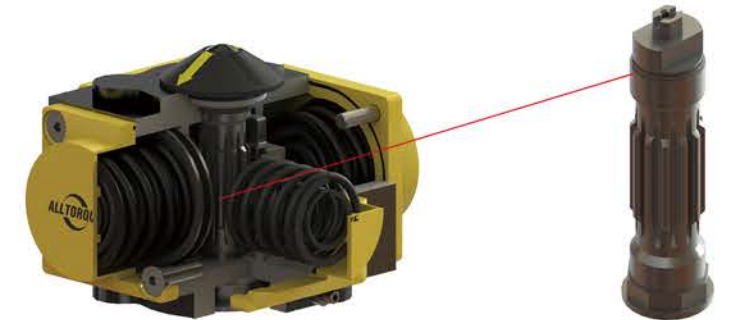
Nested springs are aligned by rings cut in the piston face and end cap. This ensures correct orientation. With four cylinder areas, many different combinations are available allowing for correct sizing.

# GENERAL FEATURES

• All Torque ® 4 x4 utilizes carbon steel pistons that allow for higher cycles because of their greater strength.

• The pistons travel half short distance than double piston models, so that the life of seals is increased more than doubled.

• Different sealing material selection applicable for temperature range from -40°C to 120°C

• Piston bearing made of material with low friction coefficient to avoid metal to metal contact. Easily replaceable for maintenance.

• Double lower drilling for valve mounting, and centering, according to ISO 5211/DIN 3337 standards.

• Independent bi-directional travel stop adjustment +/- 5°ensuring precise positioning in all flow control services , adjustable between 85°- 95° rotation.

• Direct mounted solenoid connections according to NAMUR standards. Lower female shaft key, according to ISO 5211/DIN 3337 standards, for assembly on valves with star or square shaft.

• Air supply: can be dry or lubricated filtered compressed air.

• The lubrication carried out by the manufacturer qualifies for a minimum of 1,000,000 operations.

• All Torque 4X4 provides various corrosion protection grades to adapt to different application environments according to a standard painting management system D-F complies to ISO / EN 12944. All products of All Torque have adopted DF coating specifications C2 - 02 and optimized multi-layer painting method is used in each enclosure to achieve the best corrosion resistance. Different colors and more alternative protection solutions are also available.

• Visual position indicator the 4 x 4 actuators are supplied as standard.

• The indicator designed to remain on the actuator for continuous indication when limit switch is being used.

# PARTS AND IDENTIFICATION
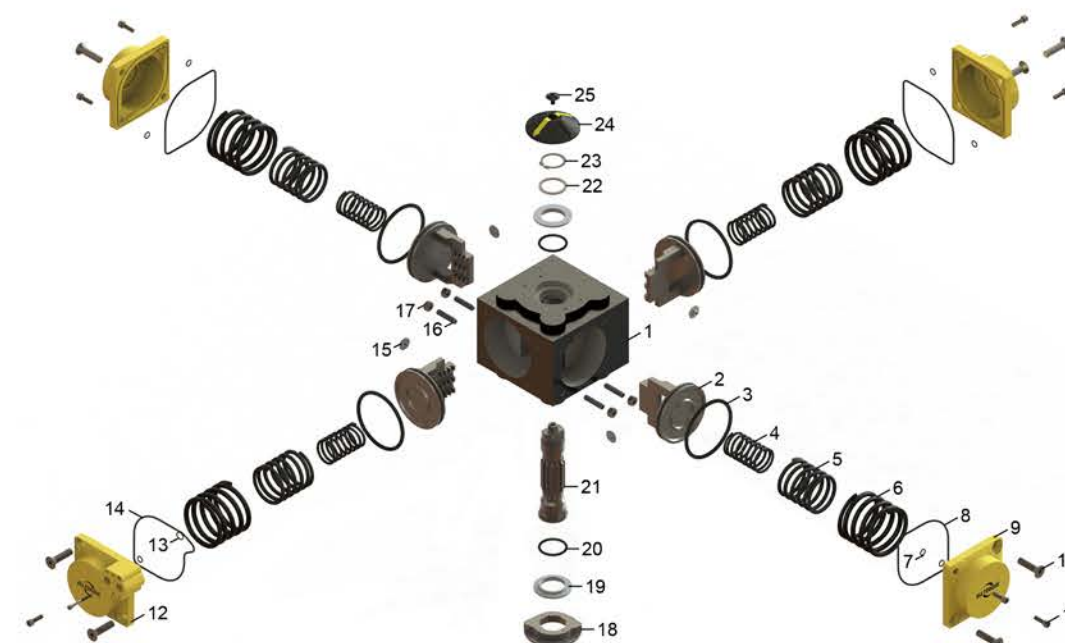


| PART NO. | QTY. | PART DESCRIPTION | MATERIAL |
|---|---|---|---|
| 1 | 1 | Body | Casting aluminium alloy |
| 2 | 4 | Piston | Carbon steel |
| 3 | 4 | O ring | NBR |
| 4 | Max 4 | Inner spring | Spring steel |
| 5 | Max 4 | Middle spring | Spring steel |
| 6 | Max 4 | Outer spring | Spring steel |
| 7 | 7 for size 090 8 for size 115 0 for rest sizes | O ring | NBR |
| 8 | 3 4 for size 115 | O ring | NBR |
| 9 | 3 4 for size 115 | Side cap | Casting aluminium alloy |
| 10 | 8 | Socket countersunk head screw | Stainless steel 304 |
| 11 | 8 for size 090 10 for size 115 0 for rest sizes | socket head cap screw | Stainless steel 304 |
| 12 | 1 | Air connecting cap | Casting aluminium alloy |
| 13 | 1 2 for size 115 | O ring | NBR |
| 14 | 1 0 for size 115 | O ring | NBR |
| 15 | 4 | Bearing Pad | POM |
| 16 | 4 | socket set screw | Stainless steel 304 |
| 17 | 4 | Nut | Stainless steel 304 |
| 18 | 1 | Stroke adjustment stop | CF8 |
| 19 | 2 | Bearing | POM |
| 20 | 2 | O ring | NBR |
| 21 | 1 | Gear shaft | Carbon steel |
| 22 | 1 | Washer | Stainless steel 304 |
| 23 | 1 | Snap ring | Stainless steel 304 |
| 24 | 1 | Indicator | ABS |
| 25 | 1 | Screw | Carbon steel |

B A



B A
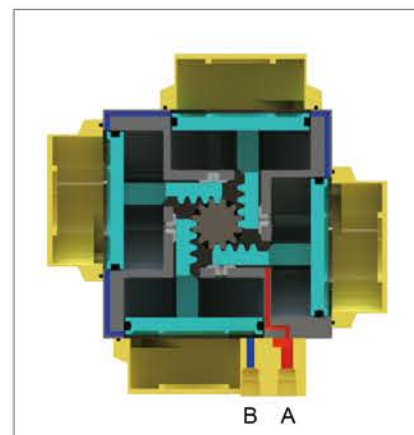
Air supplied to Port A which is connected to the center chambers forces piston apart toward end position with exhaust air exiting at Port B (a counterclockwise rotation is obtained).

Air supplied to Port B which is connected to the four chambers forces piston toward center with exhaust air exiting at Port A (a clockwise rotation is obtained).



B A



B A
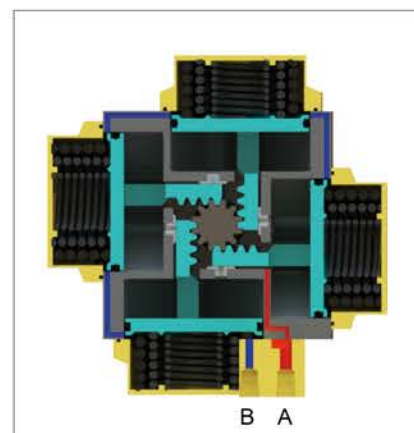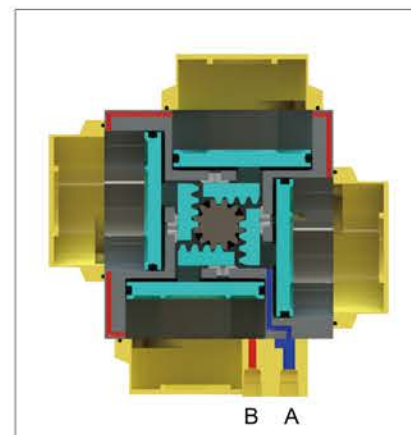
Air supplied to Port A which is connected to the center chamber forces piston apart and toward end position compressing springs, with exhaust air exiting at Port B (a counterclockwise rotation is obtained).

Release of air allows springs to force pistons toward center position with exhaust air exiting at Port A (a clockwise rotation is obtained).

The seat material used, media, temperature, frequency of operation and critical application of the valve's operation are all important factors in calculating the actuation needs of a given valve. The information provided below should be considered as a guide only and must be adjusted according to experience and judgement. Proper actuator selection is required to prevent valve or process equipment damage as well as proper valve operation.

For determining torque we assume that valve torque results from the friction between the ball and seats as well as the stem and stem seals.

## Valve Torque

The torque requirements of ball valves will vary depending on several factors

- **Seat design and material**
  The seat friction force depends on the seat material and the applicable service factor multipliers shown in the chart below.

- **Stem Seal**
  Torque results from the stem contact with stem seals and the type of packing materials affect torque. Stem seal torque needs to be considered as a percentage of overall torque especially in small valve sizes.

## Service Conditions To Consider

- Differential Pressure
- Frequency of Operation
- Media Influence
- Temperatures
- Cycle Time
- Instrument Air Supply

Minimum and maximum pressures
Stuck valve torque
Slurries, dry gases, oils
Minimum and maximums
Line hammer, process requirements
Peak demand pressure availability

## Media and Service Factor

To establish minimum torque requirements, multiply valve torque by the following application media and service factors
Additional 1.25 safety ecoefficiency must be considered when select the actuator size.

| Media Factor | Multip lier |
|---|---|
| Clean particle free , non-lubricating ( Water , alcohol or solvents ) | 1.00 |
| Clean particle free , lubricating oil | 0.80 |
| Slurries or heavily corroded and contaminate systems | 1.30 to 2.00 |
| Gas or saturated steam , clean and wet | 1.00 |
| Gas or superheated steam , clean and dry | 1.30 |
| Gas , dirty unfiltered e.g.natural gas , chlorine | 1.20 to 1.50 |

| Service Factor | Multip lier |
|---|---|
| Simple on and off Operations | 1.00 |
| Throtting | 1.20 |
| Positioner Control | 1.50 |
| Once per day session | 1.20 |
| Once every two days or more or plant critical | 1.50 |

## Double Acting Actuator (DA)

In the double acting actuators, the control pinion rotation and its reversal are obtained by reversing the supply to the two input ports. The output torques obtainable mainly depend on the cylinder diameter and the supply pressure; by increasing one or both factors, the available torque also increases. As shown in diagram A, the torque of a DA actuator is constant throughout the entire rotation and relevant reversal. The normal advised safety factor , in addition to the stated valve manufacturer torque, is 1.2.

*Select the actuator size whose torque output at given pressure exceeds the valve torque and application factor.

**START/END** **END/START**

0°    45°    90°
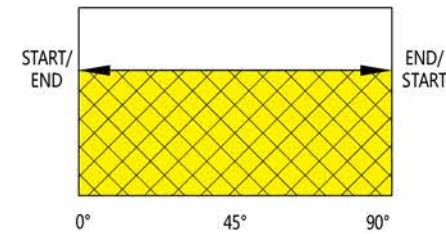
**Diag.A**

## Spring Return Actuator (SR)

In these type of actuators, which utilize springs for reversing the rotation of the control pinion, the output torque depends not only on the cylinder diameter and the supply pressure, but also on the presence of the springs, which should be compressed to guarantee the return. As shown in diagram B, the available torque at 0° progressively reduces compressionreduces during the rotation due to the springs' compression. On the contrary, as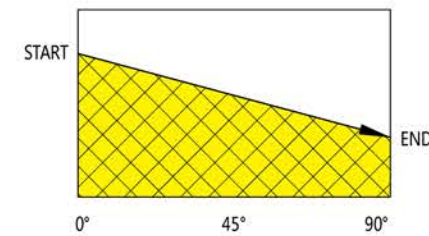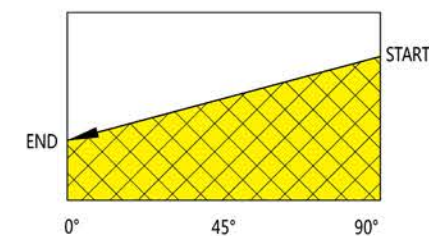 shown in diagram C, the torque starting from the 90° position constantly decreases until 0º because of spring extension. Owing to the higher friction present, the safety coefficient in this case is advised 1.25.

*Select the actuator whose torque ouput at 0° and 90° at a given air pressure exceeds the valve torque.

**START** **END**

0°    45°    90°

**Diag.B**

**END** **START**

0°    45°    90°

**Diag.C**

## Ball Valve

Ball valve construction concept is based essentially on a polished ball (including a through port) contained in two seats (upstream and downstream). The ball rotation allows the flow, or stops the flow through the valve. Differential pressure between upstream and downstream pressure forces the ball against the downstream seat (floating ball). In this case, the valve torque is generated by the friction between ball and seat and also between stem and packing. As shown in the diagram to the right, the highest torque point is when, in presence of pressure, the valve is in the closed position, and passes to the open position (breakaway torque).

ball valve torque

100%

70-80%

torque

25-30%

close    open
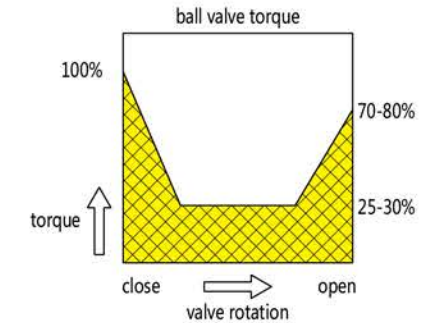
valve rotation

## Butterfly Valve

Butterfly valve construction concept is based essentially on a disc fixed on an axis, which in the closed position, is completely contained by the seat. The open position is obtained when, with a rotation , the disc (through its stem) becomes parallel to the flow. On the contrary, the closed position is obtained when the disc is perpendicular to the flow. In the case of the butterfly valve, the torque is generated by the friction between the disc and the seat, by the stem packing and also by the differential pressure thatforces on the disc. The highest torque point, as shown in the diagram , is in the closed position, and only after a small rotation it is considerably reduced.

butterfly valve torque

100%

torque

15-20%

close    open
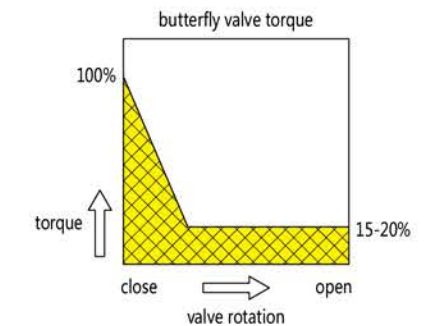
valve rotation

## Plug Valve

Plug valve construction concept is based essentially on a male (plug) contained in a female cone (seat). The plug provides a through port in one direction and with its rotation into the seat the opening and closure of the valve is obtained. The torque is usually not influenced by the flow pressure, but is generated essentially by the friction between the seat and the plug, during the opening closing cycle. As shown in the diagram to the right, the highest torque point is in the closed position and remains high for the rest of the operation, because the torque is not influenced by pressure.

plug valve torque

100%

80-90%

torque

close    open

valve rotation

**DOUBLEACTING** (Imperial)
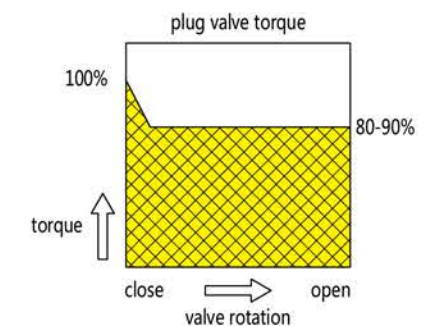
| Air Supply Pressure in PSI / Actuator Model | 40 | 60 | 70 | 80 | 90 | 100 | 120 |
|---|---|---|---|---|---|---|---|
| X40 | 89 | 133 | 156 | 178 | 200 | 222 | 267 |
| X50 | 162 | 243 | 283 | 324 | 264 | 405 | 486 |
| X60 | 299 | 448 | 523 | 598 | 672 | 747 | 896 |
| X75 | 489 | 734 | 856 | 978 | 1100 | 1223 | 1467 |
| X90 | 896 | 1344 | 1568 | 1791 | 2016 | 2240 | 2688 |
| X115 | 1665 | 2498 | 2914 | 3330 | 3747 | 4163 | 4995 |

## Imperial Unit in–lb

| Size | Spring Code | 40 START | 40 END | 60 START | 60 END | 70 START | 70 END | 80 START | 80 END | 90 START | 90 END | 100 START | 100 END | 120 START | 120 END | Spring Stroke START | Spring Stroke END |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| X40 | SR1 | 53 | 27 | 98 | 71 | 120 | 94 | 142 | 116 | 165 | 138 | 187 | 160 | 231 | 205 | 62 | 36 |
| | SR2 | 41 | 6 | 86 | 51 | 108 | 73 | 130 | 95 | 153 | 117 | 175 | 140 | 219 | 184 | 83 | 48 |
| | SR3 | | | 68 | 20 | 90 | 42 | 112 | 64 | 135 | 86 | 157 | 109 | 201 | 153 | 114 | 65 |
| | SR4 | | | | | 72 | 11 | 95 | 33 | 117 | 55 | 139 | 78 | 184 | 122 | 145 | 83 |
| X50 | SR3 | 108 | 68 | 189 | 149 | 229 | 189 | 270 | 230 | 310 | 270 | 351 | 311 | 432 | 392 | 94 | 54 |
| | SR4 | 97 | 49 | 178 | 130 | 218 | 170 | 259 | 211 | 299 | 251 | 340 | 292 | 421 | 373 | 113 | 65 |
| | SR5 | 75 | 11 | 156 | 92 | 197 | 133 | 237 | 173 | 278 | 214 | 318 | 254 | 399 | 335 | 151 | 87 |
| | SR6 | | | 135 | 55 | 175 | 95 | 216 | 136 | 256 | 176 | 297 | 217 | 378 | 298 | 188 | 108 |
| | SR7 | | | | | 164 | 76.3 | 205 | 117 | 245 | 157 | 286 | 198 | 367 | 279 | 207 | 119 |
| | SR8 | | | | | 154 | 57.4 | 194 | 97.9 | 235 | 138 | 275 | 179 | 356 | 260 | 226 | 130 |
| | SR9 | | | | | 143 | 38.6 | 183 | 79.1 | 224 | 120 | 264 | 160 | 345 | 241 | 245 | 141 |
| | SR10 | | | | | | | 172 | 60.3 | 213 | 101 | 253 | 141 | 334 | 222 | 264 | 152 |
| X60 | SR3 | 199 | 125 | 348 | 274 | 423 | 349 | 498 | 424 | 572 | 499 | 647 | 573 | 796 | 723 | 174 | 100 |
| | SR4 | 179 | 90 | 328 | 240 | 403 | 314 | 478 | 389 | 552 | 464 | 627 | 538 | 776 | 688 | 208 | 120 |
| | SR5 | 139 | 21 | 288 | 170 | 363 | 245 | 438 | 320 | 512 | 394 | 587 | 469 | 736 | 618 | 278 | 160 |
| | SR6 | | | 248 | 101 | 323 | 175 | 398 | 250 | 473 | 325 | 547 | 400 | 697 | 549 | 347 | 200 |
| | SR7 | | | | | 303 | 141 | 378 | 215 | 453 | 290 | 527 | 365 | 677 | 514 | 382 | 220 |
| | SR8 | | | | | 283 | 106 | 358 | 181 | 433 | 255 | 507 | 330 | 657 | 479 | 417 | 240 |
| | SR9 | | | | | 263 | 71.2 | 338 | 146 | 413 | 221 | 487 | 295 | 637 | 445 | 452 | 260 |
| | SR10 | | | | | | | 318 | 111 | 393 | 186 | 467 | 261 | 617 | 410 | 486 | 280 |
| X75 | SR3 | 326 | 205 | 570 | 449 | 692 | 572 | 815 | 694 | 937 | 816 | 1,059 | 938 | 1,304 | 1,183 | 284 | 163 |
| | SR4 | 293 | 148 | 537 | 392 | 660 | 515 | 782 | 637 | 904 | 759 | 1,027 | 882 | 1,271 | 1,126 | 341 | 196 |
| | SR5 | 228 | 34 | 472 | 279 | 594 | 401 | 717 | 523 | 839 | 645 | 961 | 768 | 1,206 | 1,012 | 455 | 261 |
| | SR6 | | | 407 | 165 | 529 | 287 | 651 | 409 | 774 | 532 | 896 | 654 | 1,140 | 899 | 569 | 327 |
| | SR7 | | | | | 496 | 230 | 619 | 353 | 741 | 475 | 863 | 597 | 1,108 | 842 | 626 | 360 |
| | SR8 | | | | | 464 | 174 | 586 | 296 | 708 | 418 | 830 | 540 | 1,075 | 785 | 682 | 392 |
| | SR9 | | | | | 431 | 117 | 553 | 239 | 675 | 361 | 798 | 483 | 1,042 | 728 | 739 | 425 |
| | SR10 | | | | | | | 520 | 182 | 643 | 304 | 765 | 427 | 1,010 | 671 | 796 | 458 |
| X90 | SR3 | 596 | 375 | 1,044 | 823 | 1,268 | 1,047 | 1,492 | 1,270 | 1,716 | 1,495 | 1,940 | 1,719 | 2,388 | 2,167 | 521 | 299 |
| | SR4 | 537 | 271 | 984 | 719 | 1,208 | 943 | 1,432 | 1,166 | 1,656 | 1,391 | 1,880 | 1,615 | 2,328 | 2,063 | 625 | 359 |
| | SR5 | 417 | 63 | 865 | 510 | 1,089 | 734 | 1,312 | 958 | 1,537 | 1,182 | 1,761 | 1,406 | 2,209 | 1,854 | 833 | 479 |
| | SR6 | | | 745 | 302 | 969 | 526 | 1,192 | 749 | 1,417 | 974 | 1,641 | 1,198 | 2,089 | 1,646 | 1,042 | 599 |
| | SR7 | | | | | 909 | 422 | 1,132 | 645 | 1,357 | 870 | 1,581 | 1,094 | 2,029 | 1,542 | 1,146 | 659 |
| | SR8 | | | | | 849 | 318 | 1,073 | 541 | 1,297 | 766 | 1,521 | 990 | 1,969 | 1,438 | 1,250 | 718 |
| | SR9 | | | | | 789 | 214 | 1,013 | 437 | 1,237 | 661 | 1,461 | 885 | 1,909 | 1,333 | 1,354 | 778 |
| | SR10 | | | | | | | 953 | 333 | 1,177 | 557 | 1,401 | 781 | 1,849 | 1,229 | 1,458 | 838 |
| X115 | SR3 | 1,109 | 697 | 1,941 | 1,530 | 2,357 | 1,946 | 2,774 | 2,362 | 3,190 | 2,778 | 3,606 | 3,195 | 4,439 | 4,027 | 968 | 556 |
| | SR4 | 997 | 503 | 1,830 | 1,336 | 2,246 | 1,752 | 2,662 | 2,169 | 3,079 | 2,585 | 3,495 | 3,001 | 4,328 | 3,834 | 1,162 | 668 |
| | SR5 | 775 | 116 | 1,607 | 949 | 2,024 | 1,365 | 2,440 | 1,781 | 2,856 | 2,198 | 3,272 | 2,614 | 4,105 | 3,446 | 1,549 | 890 |
| | SR6 | | | 1,385 | 562 | 1,801 | 978 | 2,217 | 1,394 | 2,634 | 1,810 | 3,050 | 2,227 | 3,882 | 3,059 | 1,936 | 1,113 |
| | SR7 | | | | | 1,690 | 784 | 2,106 | 1,200 | 2,522 | 1,617 | 2,939 | 2,033 | 3,771 | 2,866 | 2,130 | 1,224 |
| | SR8 | | | | | 1,578 | 591 | 1,995 | 1,007 | 2,411 | 1,423 | 2,827 | 1,839 | 3,660 | 2,672 | 2,323 | 1,335 |
| | SR9 | | | | | 1,467 | 397 | 1,883 | 813 | 2,300 | 1,230 | 2,716 | 1,646 | 3,549 | 2,478 | 2,517 | 1,447 |
| | SR10 | | | | | | | 1,772 | 620 | 2,188 | 1,036 | 2,605 | 1,452 | 3,437 | 2,285 | 2,711 | 1,558 |

---

**DOUBLEACTING** (Metric)

| Air Supply Pressure in BAR / Actuator Model | 3 | 4 | 5 | 5.5 | 6 | 7 | 8 |
|---|---|---|---|---|---|---|---|
| X40 | 11 | 15 | 18 | 20 | 22 | 26 | 29 |
| X50 | 20 | 27 | 33 | 37 | 40 | 46 | 53 |
| X60 | 37 | 49 | 61 | 67 | 73 | 86 | 98 |
| X75 | 60 | 80 | 100 | 110 | 120 | 140 | 160 |
| X90 | 110 | 147 | 184 | 202 | 220 | 257 | 294 |
| X115 | 205 | 273 | 341 | 375 | 409 | 477 | 546 |

## Metric Unit Nm

| Size | Spring Code | 40 START | 40 END | 60 START | 60 END | 70 START | 70 END | 80 START | 80 END | 90 START | 90 END | 100 START | 100 END | 120 START | 120 END | Spring Stroke START | Spring Stroke END |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| X40 | SR4 | 7 | 4 | 11 | 8 | 14 | 11 | 16 | 13 | 18 | 15 | 21 | 18 | 25 | 22 | 7 | 4 |
| | SR5 | 6 | 2 | 9 | 5 | 13 | 9 | 15 | 11 | 17 | 13 | 20 | 16 | 24 | 20 | 9 | 5 |
| | SR7 | | | 7 | 2 | 11 | 5 | 13 | 7 | 15 | 9 | 18 | 13 | 22 | 16 | 13 | 7 |
| | SR10 | | | | | 9 | 2 | 11 | 4 | 12 | 6 | 16 | 9 | 20 | 13 | 16 | 9 |
| X50 | SR3 | 14 | 9 | 20 | 16 | 27 | 23 | 30 | 26 | 34 | 29 | 40 | 36 | 47 | 42 | 11 | 6 |
| | SR4 | 13 | 7 | 19 | 14 | 26 | 20 | 29 | 24 | 32 | 27 | 39 | 34 | 46 | 40 | 13 | 7 |
| | SR5 | 10 | 3 | 17 | 10 | 23 | 16 | 27 | 19 | 30 | 23 | 37 | 29 | 43 | 36 | 17 | 10 |
| | SR6 | | | 14 | 5 | 21 | 12 | 24 | 15 | 28 | 19 | 34 | 25 | 41 | 32 | 21 | 12 |
| | SR7 | | | | | 20 | 10 | 23 | 13 | 26 | 16 | 33 | 23 | 40 | 30 | 23 | 13 |
| | SR8 | | | | | 18 | 8 | 22 | 11 | 25 | 14 | 32 | 21 | 38 | 28 | 26 | 15 |
| | SR9 | | | | | 17 | 6 | 21 | 9 | 24 | 12 | 31 | 19 | 37 | 25 | 28 | 16 |
| | SR10 | | | | | | | 19 | 7 | 23 | 10 | 29 | 17 | 36 | 23 | 30 | 17 |
| X60 | SR3 | 25 | 17 | 38 | 29 | 50 | 42 | 56 | 48 | 62 | 54 | 74 | 66 | 87 | 78 | 20 | 11 |
| | SR4 | 23 | 13 | 35 | 25 | 48 | 38 | 54 | 44 | 60 | 50 | 72 | 62 | 84 | 74 | 24 | 14 |
| | SR5 | 19 | 5 | 31 | 18 | 43 | 30 | 49 | 36 | 55 | 42 | 68 | 54 | 80 | 67 | 31 | 18 |
| | SR6 | | | 26 | 10 | 39 | 22 | 45 | 28 | 51 | 34 | 63 | 46 | 75 | 59 | 39 | 23 |
| | SR7 | | | | | 36 | 18 | 42 | 24 | 49 | 30 | 61 | 43 | 73 | 55 | 43 | 25 |
| | SR8 | | | | | 34 | 14 | 40 | 20 | 46 | 26 | 59 | 39 | 71 | 51 | 47 | 27 |
| | SR9 | | | | | 32 | 10 | 38 | 16 | 44 | 22 | 56 | 35 | 69 | 47 | 51 | 29 |
| | SR10 | | | | | | | 36 | 12 | 42 | 18 | 54 | 31 | 66 | 43 | 55 | 32 |
| X70 | SR3 | 42 | 28 | 62 | 48 | 82 | 68 | 92 | 78 | 102 | 88 | 122 | 108 | 142 | 128 | 32 | 18 |
| | SR4 | 38 | 22 | 58 | 42 | 78 | 62 | 88 | 72 | 98 | 82 | 118 | 102 | 138 | 122 | 39 | 22 |
| | SR5 | 31 | 9 | 51 | 29 | 71 | 49 | 81 | 59 | 91 | 69 | 111 | 89 | 131 | 109 | 51 | 30 |
| | SR6 | | | 43 | 16 | 63 | 36 | 73 | 46 | 83 | 56 | 103 | 76 | 123 | 96 | 64 | 37 |
| | SR7 | | | | | 60 | 30 | 70 | 40 | 80 | 50 | 100 | 70 | 120 | 90 | 71 | 41 |
| | SR8 | | | | | 56 | 23 | 66 | 33 | 76 | 43 | 96 | 63 | 116 | 83 | 77 | 44 |
| | SR9 | | | | | 52 | 17 | 62 | 27 | 72 | 37 | 92 | 57 | 112 | 77 | 84 | 48 |
| | SR10 | | | | | | | 59 | 20 | 69 | 30 | 89 | 50 | 109 | 70 | 90 | 52 |
| X90 | SR3 | 76 | 51 | 113 | 88 | 150 | 125 | 168 | 143 | 186 | 161 | 223 | 198 | 260 | 235 | 59 | 34 |
| | SR4 | 70 | 39 | 106 | 76 | 143 | 113 | 161 | 131 | 180 | 150 | 216 | 186 | 253 | 223 | 71 | 41 |
| | SR5 | 56 | 16 | 93 | 53 | 129 | 89 | 148 | 108 | 166 | 126 | 203 | 163 | 239 | 199 | 94 | 54 |
| | SR6 | | | 79 | 29 | 116 | 66 | 134 | 84 | 153 | 103 | 189 | 139 | 226 | 176 | 118 | 68 |
| | SR7 | | | | | 109 | 54 | 127 | 72 | 146 | 91 | 182 | 127 | 219 | 164 | 129 | 74 |
| | SR8 | | | | | 102 | 42 | 121 | 61 | 139 | 79 | 176 | 116 | 212 | 152 | 141 | 81 |
| | SR9 | | | | | 96 | 31 | 114 | 49 | 132 | 67 | 169 | 104 | 206 | 141 | 153 | 88 |
| | SR10 | | | | | | | 107 | 37 | 126 | 55 | 162 | 92 | 199 | 129 | 165 | 95 |
| X115 | SR3 | 142 | 95 | 210 | 163 | 278 | 232 | 312 | 266 | 346 | 300 | 415 | 368 | 483 | 436 | 109 | 63 |
| | SR4 | 129 | 73 | 197 | 142 | 266 | 210 | 300 | 244 | 334 | 278 | 402 | 346 | 470 | 414 | 131 | 75 |
| | SR5 | 104 | 30 | 172 | 98 | 240 | 166 | 275 | 200 | 309 | 234 | 377 | 302 | 445 | 371 | 175 | 101 |
| | SR6 | | | 147 | 54 | 215 | 122 | 249 | 156 | 283 | 190 | 352 | 259 | 420 | 327 | 219 | 126 |
| | SR7 | | | | | 203 | 100 | 237 | 135 | 271 | 169 | 339 | 237 | 407 | 305 | 241 | 138 |
| | SR8 | | | | | 190 | 79 | 224 | 113 | 258 | 147 | 327 | 215 | 395 | 283 | 262 | 151 |
| | SR9 | | | | | 178 | 57 | 212 | 91 | 246 | 125 | 314 | 193 | 382 | 261 | 284 | 163 |
| | SR10 | | | | | | | 199 | 69 | 233 | 103 | 301 | 171 | 370 | 239 | 306 | 176 |

## SPRING ARRANGEMENT



A  B
1
2
3
4
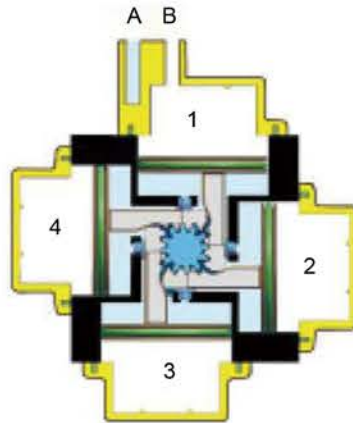
*No outer spring for model X40.

| SPRING SETS CODES | SPRING POSITION | CHAMBER1 | CHAMBER2 | CHAMBER2 | CHAMBER2 |
|---|---|---|---|---|---|
| 1 | Inner Spring | √ | √ | √ | √ |
| | Middle Spring | - | - | - | - |
| | Outer Spring | - | - | - | - |
| 2 | Inner Spring | - | - | - | - |
| | Middle Spring | √ | √ | √ | √ |
| | Outer Spring | - | - | - | - |
| 3 | Inner Spring | √ | - | √ | - |
| | Middle Spring | √ | √ | √ | √ |
| | Outer Spring | - | - | - | - |
| 4 | Inner Spring | √ | √ | √ | √ |
| | Middle Spring | √ | √ | √ | √ |
| | Outer Spring | - | - | - | - |
| 5 | Inner Spring | √ | √ | √ | √ |
| | Middle Spring | - | √ | - | √ |
| | Outer Spring | √ | - | √ | - |
| 6 | Inner Spring | √ | √ | √ | √ |
| | Middle Spring | - | - | - | - |
| | Outer Spring | √ | √ | √ | √ |
| 7 | Inner Spring | √ | - | √ | - |
| | Middle Spring | - | √ | - | √ |
| | Outer Spring | √ | √ | √ | √ |
| 8 | Inner Spring | - | - | - | - |
| | Middle Spring | √ | √ | √ | √ |
| | Outer Spring | √ | √ | √ | √ |
| 9 | Inner Spring | √ | - | √ | - |
| | Middle Spring | √ | √ | √ | √ |
| | Outer Spring | √ | √ | √ | √ |
| 10 | Inner Spring | √ | √ | √ | √ |
| | Middle Spring | √ | √ | √ | √ |
| | Outer Spring | √ | √ | √ | √ |

## TECHNICAL DATA

| | SIZE | X40 | X50 | X60 | X75 | X90 | X115 |
|---|---|---|---|---|---|---|---|
| Weight of Double Acting | Lb | 2.39 | 3.86 | 6.81 | 10.69 | 16.42 | 28.66 |
| | Kg | 1.08 | 1.75 | 3.09 | 4.85 | 7.45 | 13.00 |
| Weight of Double Acting With SR Cover ( DS ) | Lb | 2.42 | 3.96 | 6.97 | 00.16 | 17.17 | 29.78 |
| | Kg | 1.10 | 1.80 | 3.16 | 5.06 | 7.79 | 13.51 |
| Code of Spring Return | | Weight of Spring Return Actuator | | | | | |
| 01 | Lb | 2.51 | × | × | × | × | × |
| | Kg | 1.41 | × | × | × | × | × |
| 02 | Lb | 2.60 | × | × | × | × | × |
| | Kg | 1.18 | × | × | × | × | × |
| 03 | Lb | 2.67 | 4.17 | 7.50 | 02.19 | 18.92 | 33.27 |
| | Kg | 1.21 | 1.89 | 3.10 | 5.52 | 8.58 | 15.09 |
| 04 | Lb | 2.73 | 4321 | 7.58 | 12.35 | 19.22 | 33.91 |
| | Kg | 1.24 | 1.91 | 3.11 | 5.60 | 8.72 | 15.38 |
| 05 | Lb | × | 4.30 | 7.76 | 12.63 | 19.69 | 34.55 |
| | Kg | × | 1.95 | 3.52 | 5.73 | 8.93 | 15.67 |
| 06 | Lb | × | 4.39 | 7.94 | 12.92 | 20.15 | 35.19 |
| | Kg | × | 1.99 | 3.60 | 5.86 | 9.14 | 15.96 |
| 07 | Lb | × | 4.43 | 7.98 | 13.07 | 20.9 | 35.98 |
| | Kg | × | 2.01 | 3.62 | 5.93 | 9.25 | 16.32 |
| 08 | Lb | × | 4.52 | 8.20 | 13.41 | 20.92 | 36.77 |
| | Kg | × | 2.05 | 3.78 | 6.11 | 9.49 | 16.68 |
| 09 | Lb | × | 4.56 | 8.29 | 13.62 | 21.25 | 37.41 |
| | Kg | × | 2.07 | 3.76 | 6.18 | 9.64 | 16.97 |
| 10 | Lb | × | 4.63 | 8.38 | 13.78 | 21.56 | 38.03 |
| | Kg | × | 2.10 | 3.80 | 6.25 | 9.78 | 17.25 |
| Air Consumption per stroke ** Actual Voiume-Litre | CCW | 0.08 | 0.15 | 0.29 | 0.47 | 0.80 | 1.3 |
| | CW | 0.11 | 0.19 | 0.39 | 0.64 | 0.95 | 1.3 |
| | TOtal | 0.19 | 0.34 | 0.64 | 1.11 | 1.75 | 2.6 |
| Air Consumption per stroke ** Actual Voiume-in$^3$ | CCW | 4.9 | 9.2 | 16.2 | 28.7 | 46.3 | 79.3 |
| | CW | 6.7 | 11.6 | 21.3 | 35.1 | 52.3 | 82.6 |
| | TOtal | 11.6 | 20.7 | 37.5 | 63.8 | 98.6 | 161.9 |
| Opening Time DA * | Sec. | 0.15 | 0.21 | 0.39 | 0.53 | 1.10 | 1.60 |
| Closing Time DA * | Sec. | 0.16 | 0.24 | 0.41 | 0.54 | 1.30 | 1.80 |

* The above indicated moving time of the actuator, are obtained in the following testcons: (1) Room Temperature. (2) Actuator Stroke 90° (3) Solenoid Valve with orifice of 4mm and flow capacity Qn 400/ L/min. (4) Inside pipe diameter 8mm, (5) Medium clean air, (6) Air supply pressure 5.5 bar (79, 75psi), (7) Actuator without external resistance load. Cautions: on the field applications when one or more of the above parameters are different, the moving time will be different.
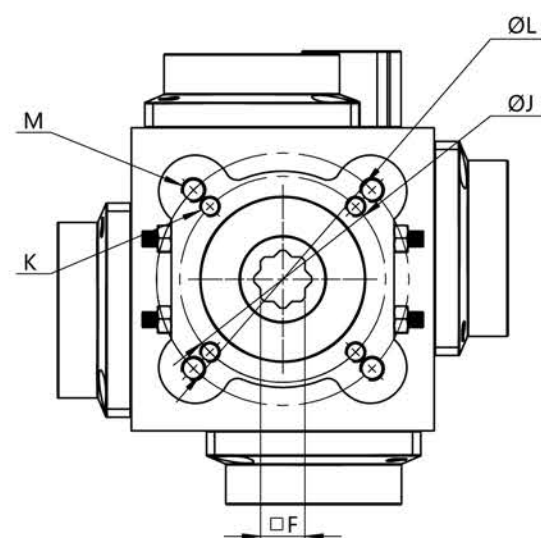
| Accesory Top Mount NAMUR Standard VDINDE 3845 Bottom Mount ISO 5211 | | |
|---|---|---|
| **Working Temperature** | | |
| NBR | -20° C to 80° C | -4° F to 176° F |
| Fluorine rubber | -20° C to 120° C | -4° F to 250° F |
| Improved NBR | -40° C to 80° C | -40° F to 176° F |
| **Working Pressure** | | |
| DA | 20 to 120 PSI | 1.5 to 8 bar |
| SR | 30 to 120 PSI | 2.0 to 8 bar |

## TOP VIEW
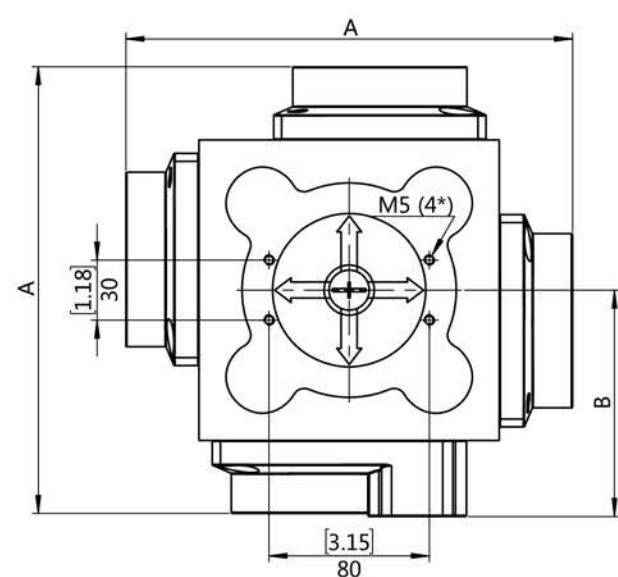
## BOTTOM VIEW
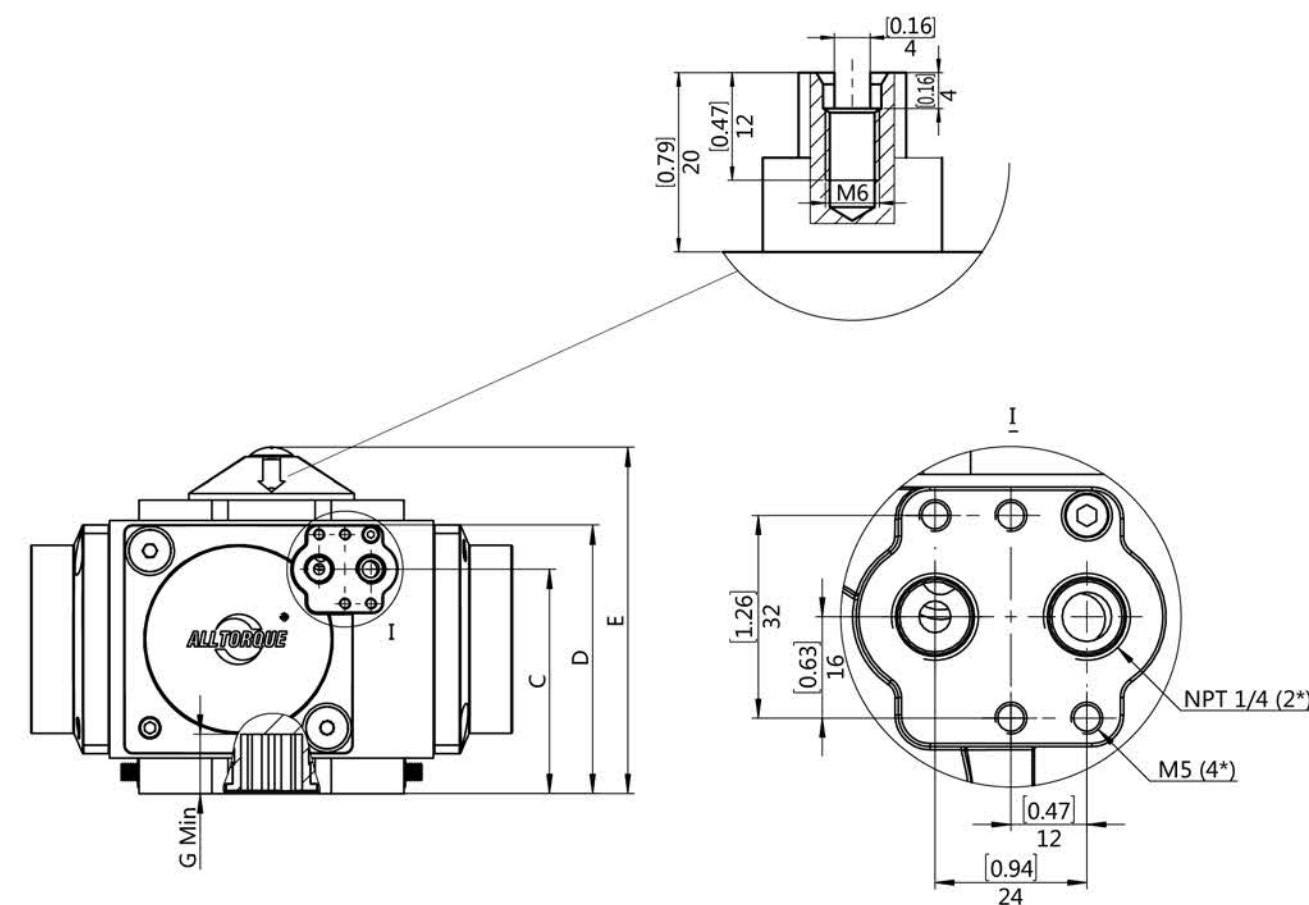


| SIZE | A | | B | | C | | D | | E | |
|------|------|------|------|------|------|------|-------|------|-------|------|
| | mm | inch | mm | inch | mm | inch | mm | inch | mm | inch |
| X40 | 110.0 | 4.33 | 66.0 | 2.60 | 51.7 | 2.04 | 69.1 | 2.73 | 92.5 | 3.65 |
| X50 | 135.6 | 5.34 | 77.4 | 3.05 | 63.4 | 2.50 | 80.0 | 3.15 | 103.5 | 4.08 |
| X60 | 164.0 | 6.46 | 89.5 | 3.52 | 76.6 | 3.02 | 98.0 | 3.86 | 120.0 | 4.73 |
| X75 | 199.0 | 7.83 | 95.0 | 3.74 | 93.1 | 3.67 | 118.0 | 4.65 | 138.5 | 5.46 |
| X90 | 224.0 | 8.82 | 114.0 | 4.49 | 102.5 | 4.04 | 136.0 | 5.36 | 156.5 | 6.17 |
| X115 | 274.0 | 10.79 | 112.0 | 4.41 | 119.2 | 4.70 | 165.0 | 6.50 | 189.0 | 7.45 |

| SIZE | F | | G | | J | | K | L | | M |
|------|------|------|------|------|------|------|------|------|------|------|
| | mm | inch | mm | inch | mm | inch | mm | mm | inch | mm |
| X40 | 9.0 | 0.35 | 14.0 | 0.56 | 50 | 1.97 | M6 | / | / | / |
| X50 | 11.0 | 0.43 | 15.5 | 0.62 | 50 | 1.97 | M6 | 70 | 2.76 | M8 |
| X60 | 14.0 | 0.55 | 19.5 | 0.77 | 70 | 2.76 | M8 | 102 | 4.02 | M10 |
| X75 | 17.0 | 0.67 | 22.5 | 0.89 | 70 | 2.76 | M8 | 102 | 4.02 | M10 |
| X90 | 22.0 | 0.87 | 26.5 | 1.05 | 102 | 4.02 | M10 | / | / | / |
| X115 | 27.0 | 1.06 | 32.5 | 1.28 | 125 | 4.92 | M12 | / | / | / |