

## 1. Pressure Ranges

40 psig to 100 psig  
3 bar to 8 bar

## 2. Temperature Ranges

\*Std.(NBR O-rings): -20°C (-4°F) to +80°C (+176°F)

\*Lower Temp. (Silicone O-rings): -40°C (-40°F) to +80°C (+176°F)

\*High Temp. (Viton O-rings): -15°C (+5°F) to +150°C (+300°F)

Note: Special grease is required for low and high temperature service condition.

## 3. Wide Range Available

The actuator range consists of 14 sizes, with torques from 9.7N.m(88in.lbs) to 4,122N.m (37,763in.lbs) at 6 bar (90 psig) air supply.

## 4. Operating Media

Filtered dry or lubricated air for non-corrosive gas, water or light hydraulic oil. The maximum particle size must not exceed 30 microns.

## 5. Stroke Adjustment

0° and 90° with standard adjustment  $\pm 5^\circ$ .

## 6. Lubrication

All moving parts are factory lubricated for entire life cycle of actuator.

## 7. Construction

Twin piston rack and pinion actuator design, suitable for indoor and outdoor installation.

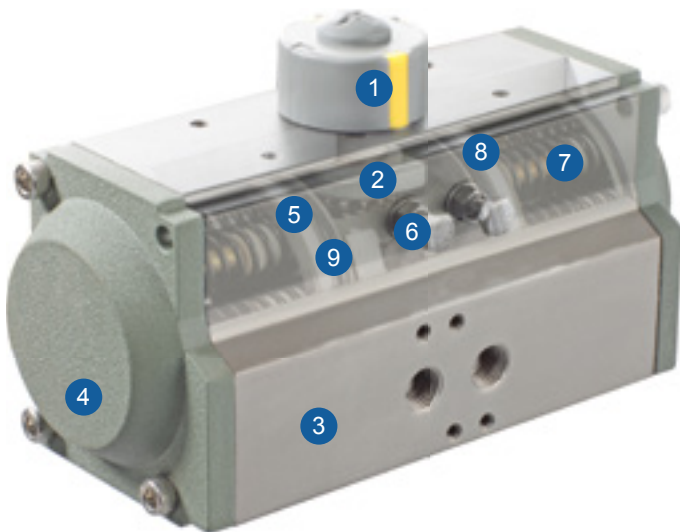
## 8. Connections

Bottom drilling complies with ISO 5211/DIN 3337 to match valve. Interface for solenoid valve, shaft top end and top drilling for assembling accessories are in accordance with VDI/VDE-3845, NAMUR standard.

## 9. Inspection

Every actuator is hydraulically tested, certified and guaranteed for a minimum of 500,000 cycles.





## 1. Indicator

A position indicator with Namur mounting is standard on all HAITIMA pneumatic actuators for mounting accessories.

## 2. Pinion

The hardened alloy steel pinion is precision ground and Nickel plated (over 25um) in order to reduce friction, provide maximum wear resistance. Full conformance with the newest standards of ISO5211 & DIN3337. The dimensions can be customized and as options, stainless steel and aluminium are also available.

## 3. Actuator Body

The aluminum extrusion is hard anodized(over 30um) to protect against wear and corrosion while reducing piston friction to the absolute minimum. Other options such as Nickel plating, PTFE and powder polyester painting are available.

## 4. End Caps

Epoxy coated(over 150um) die cast aluminum end caps provide maximum resistance against potentially corrosive elements. Other treatments such as Nickel plating & PTFE painting are available.

## 5. Pistons

The precisely-balanced and hard anodized treatment (over 30um) die cast aluminum pistons are fitted with high quality rings and guides. The twin rack and piston design creates a constant torque output on all actuators.

## 6. Travel Adjustment

The standard adjustment is  $\pm 5^\circ$  in both the open and closed positions through easily accessible external adjustment bolts.

## 7. High Performance Springs

The high tensile steel springs are coated with zinc phosphate for corrosion resistance and longer service. The pre-loaded springs can be safely & rapidly disassembled.

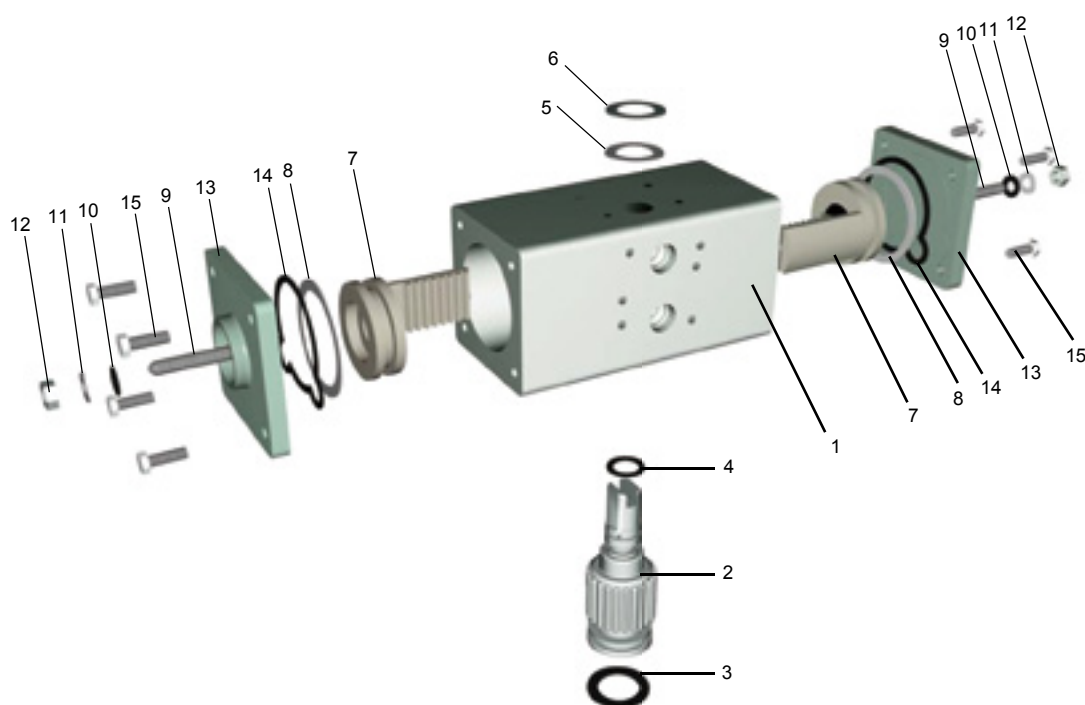
## 8. Bearings & Guides

The highly durable compound material provides high trust stability with minimum friction and long life.

## 9. O-Rings

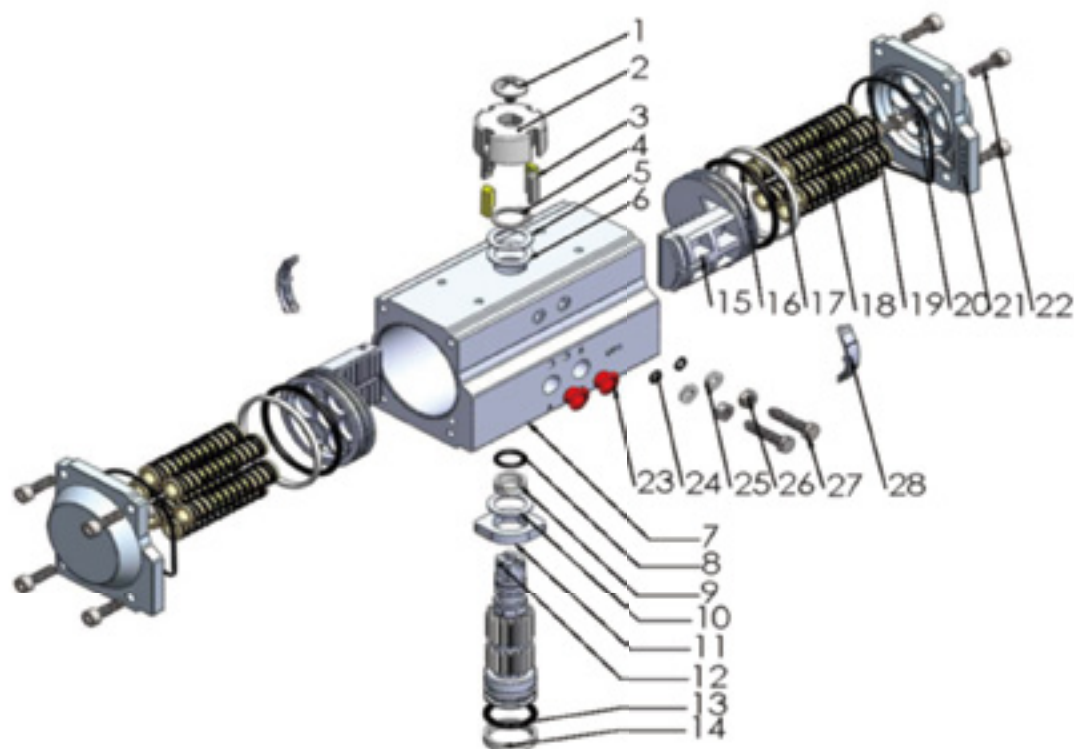
NBR O-rings provide trouble-free operation at standard temperature ranges. Viton and Silicone O-rings are available for high or low temperature applications.

# Pneumatic Actuator – HTD032 Parts List



| Item | Description               | Material                 | Protection                | Q'ty | Optional              |
|------|---------------------------|--------------------------|---------------------------|------|-----------------------|
| 1    | Actuator Body             | Extruded Alluminum Alloy | Hard Anodized (over 30um) | 1    | Nickel or PTFE Plated |
| 2    | Pinion                    | Alloy Steel              | Nickel Plated (over 25um) | 1    |                       |
| 3*   | O-Ring(Lower Pinion)      | NBR                      |                           | 1    | Viton / Silicone      |
| 4*   | O-Ring(Top Pinion)        | NBR                      |                           | 1    | Viton / Silicone      |
| 5    | Thrust Bearing(Pinion)    | POM                      |                           | 1    |                       |
| 6    | Spring Clip               | Stainless Steel          |                           | 1    |                       |
| 7    | Piston                    | Die Cast Aluminum Alloy  | Hard Anodized (over 30um) | 2    |                       |
| 8*   | Piston Seal               | NBR                      |                           | 2    | Viton / Silicone      |
| 9    | Stroke Bolt               | Stainless Steel          |                           | 2    |                       |
| 10*  | Stroke Bolt O-Ring        | NBR                      |                           | 2    | Viton / Silicone      |
| 11   | Stroke Bolt Washer        | Stainless Steel          |                           | 2    |                       |
| 12   | Stroke Bolt Retaining Nut | Stainless Steel          |                           | 2    |                       |
| 13   | End Cap                   | Die Cast Aluminum        | Epoxy Coated (over 150um) | 2    | Nickel or PTFE Plated |
| 14*  | End Cap Seals             | NBR                      |                           | 2    | Viton / Silicone      |
| 15   | End Cap Bolts             | Stainless Steel          |                           | 8    |                       |

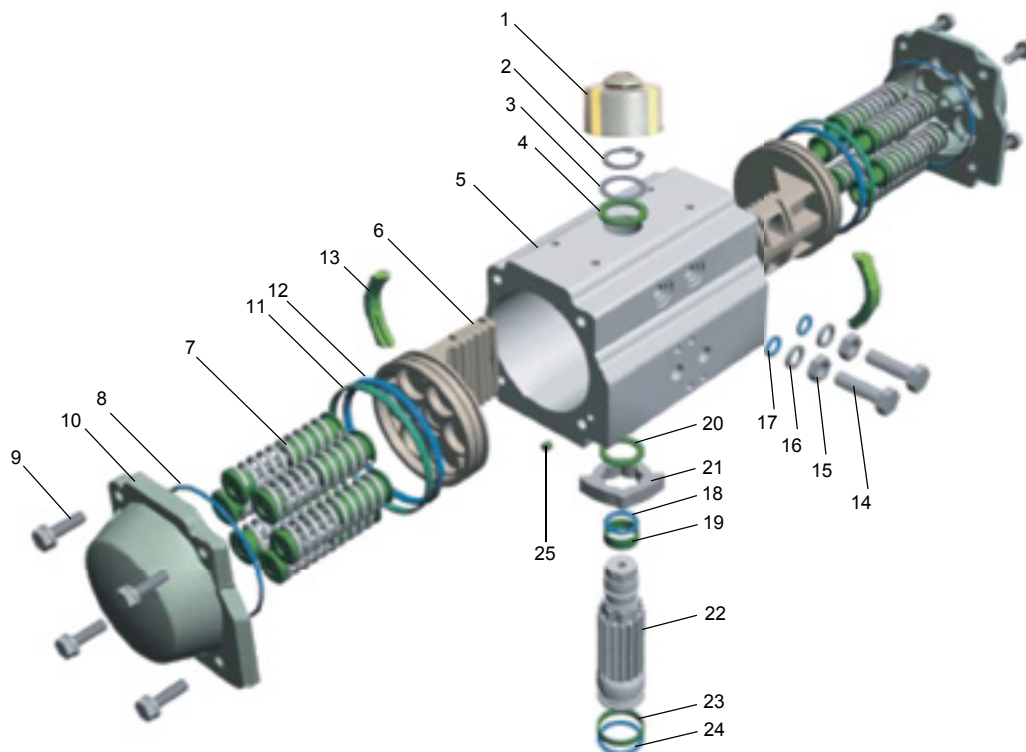
\*Note: Recommended spare parts for maintenance.



| Item | Description               | Material                      | Protection                | Q'ty | Optional       |
|------|---------------------------|-------------------------------|---------------------------|------|----------------|
| 1    | Screw                     | ABS+304                       |                           | 1    |                |
| 2    | Indicator                 | Plastic                       |                           | 1    |                |
| 3    | Indicator Pin             | ABS                           |                           | 4    |                |
| 4    | Spring Clip               | Stainless Steel               |                           | 1    |                |
| 5    | Thrust Washer (Pinion)    | Stainless Steel               |                           | 1    |                |
| 6*   | Thrust Bearing (Pinion)   | POM                           |                           | 1    |                |
| 7    | Actuator Body Extruded    | Extruded Aluminum Alloy       | Hard Anodized (over 30μm) | 1    |                |
| 8*   | O-Ring (Top Pinion)       | NBR                           |                           | 1    | Viton/Silicone |
| 9*   | Bearing (Top Pinion)      | POM                           |                           | 1    |                |
| 10*  | Thrust Bearing (Pinion)   | POM                           |                           | 1    |                |
| 11   | Stroke Cam                | Stainless Steel               |                           | 1    |                |
| 12   | Pinion                    | Alloy Steel                   | Nickel Plated (over 25μm) | 1    |                |
| 13*  | Bearing (Lower Pinion)    | POM                           |                           | 1    |                |
| 14*  | O-Ring (Lower Pinion)     | NBR                           |                           | 1    | Viton/Silicone |
| 15   | Piston                    | Die Cast Aluminum Alloy       | Hard Anodized (over 30μm) | 2    |                |
| 16*  | Piston Seal               | NBR                           |                           | 2    | Viton/Silicone |
| 17*  | Piston Bearing            | POM                           |                           | 2    |                |
| 18   | Spring (Cartridge)        | High Performance Spring Steel | Zinc Phosphate Coated     | 0-12 |                |
| 19*  | End Cap Seals             | NBR                           |                           | 2    | Viton/Silicone |
| 20   | Stroke Bolt               | Stainless Steel               |                           | 1    |                |
| 21   | End Cap                   | Die Cast Aluminum             | Epoxy Coated (over 150μm) | 2    |                |
| 22   | End Cap Bolts             | Stainless Steel               |                           | 8    |                |
| 23   | Plug                      | PE                            |                           | 2    |                |
| 24*  | Stroke Bolt O-Ring        | NBR                           |                           | 2    | Viton/Silicone |
| 25   | Stroke Bolt Washer        | Stainless Steel               |                           | 2    |                |
| 26   | Stroke Bolt Retaining Nut | Stainless Steel               |                           | 2    |                |
| 27   | Stroke Bolt               | Stainless Steel               |                           | 2    |                |
| 28*  | Piston Guide              | POM                           |                           | 2    |                |

\* Note: Recommended spare parts for maintenance.

# Pneumatic Actuator – HTS105~270 Parts List



| Item | Description               | Material                      | Protection                | Q'ty | Optional              |
|------|---------------------------|-------------------------------|---------------------------|------|-----------------------|
| 1    | Indicator                 | ABS                           |                           | 1    |                       |
| 2    | Spring Clip               | Stainless Steel               |                           | 1    |                       |
| 3    | Thrust Washer(Pinion)     | Stainless Steel               |                           | 1    |                       |
| 4    | Thrust Bearing(Pinion)    | PTFE+15%Graphite              |                           | 1    |                       |
| 5    | Actuator Body             | Extruded Alluminum Alloy      | Hard Anodized(over 30um)  | 1    | Nickel or PTFE Plated |
| 6    | Piston                    | Die Cast Aluminum Alloy       | Hard Anodized(over 30um)  | 2    |                       |
| 7    | Spring(Cartridge)         | High Performance Spring Steel | Electrophoretic Paint     | 0-12 |                       |
| 8*   | End Cap Seals             | NBR                           |                           | 2    | Viton / Silicone      |
| 9    | End Cap Bolts             | Stainless Steel               |                           | 8    |                       |
| 10   | End Cap                   | Die Cast Aluminum             | Epoxy Coated(over 150um)  | 2    | Nickel or PTFE Plated |
| 11*  | Piston Bearing            | POM                           |                           | 2    |                       |
| 12*  | Piston Seal               | NBR                           |                           | 2    | Viton / Silicone      |
| 13*  | Piston Guide              | POM                           |                           | 2    |                       |
| 14   | Stroke Bolt               | Stainless Steel               |                           | 2    |                       |
| 15   | Stroke Bolt Retaining Nut | Stainless Steel               |                           | 2    |                       |
| 16   | Stroke Bolt Washer        | Stainless Steel               |                           | 2    |                       |
| 17*  | Stroke Bolt O-Ring        | NBR                           |                           | 2    | Viton / Silicone      |
| 18*  | O-Ring(Top Pinion)        | NBR                           |                           | 1    | Viton / Silicone      |
| 19*  | Bearing(Top Pinion)       | POM                           |                           | 1    |                       |
| 20*  | Thrust Bearing(Pinion)    | POM                           |                           | 1    |                       |
| 21   | Stroke Cam                | Carbon Steel                  | Galvanized                | 1    |                       |
| 22   | Pinion                    | Alloy Steel                   | Nickel Plated (over 25um) | 1    |                       |
| 23*  | Bearing(Lower Pinion)     | POM                           |                           | 1    |                       |
| 24*  | O-Ring(Lower Pinion)      | NBR                           |                           | 1    | Viton / Silicone      |
| 25*  | Plug                      | NBR                           |                           | 2    | Viton / Silicone      |

\* Note: Recommended spare parts for maintenance.

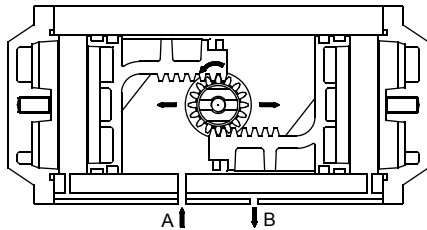


Sizing example of HAITIMA double acting actuator:

Valve torque 100Nm plus 30% safety factor= 130N.m. Minimum operating pressure 6bar. By reading down the 6bar column the figure below 130N.m is 189.4N.m, The model number shown in the left hand column is therefore HTD-105.

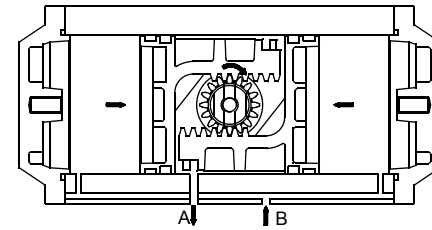
The operating principle of double acting actuator

CCW-counter-clockwise



Air to port A forces the pistons outwards, causing the piston to turn counter-clockwise while air is being exhausted from port B.

CW-clockwise



Air to port B forces the pistons inwards, causing the piston to turn clockwise while air is being exhausted from port A.

Torque Table of Double Acting Actuator

Unit: in.lbs

| Model   | Air Supply Pressure |        |        |        |        |        |         |
|---------|---------------------|--------|--------|--------|--------|--------|---------|
|         | 40 Psi              | 50 Psi | 60 Psi | 70 Psi | 80 Psi | 90 Psi | 100 Psi |
| HTD-032 | 33                  | 43     | 54     | 63     | 72     | 80     | 86      |
| HTD-052 | 94                  | 118    | 142    | 165    | 189    | 212    | 236     |
| HTD-063 | 168                 | 210    | 252    | 294    | 336    | 378    | 420     |
| HTD-075 | 274                 | 342    | 409    | 477    | 545    | 613    | 681     |
| HTD-083 | 344                 | 430    | 516    | 602    | 688    | 775    | 860     |
| HTD-092 | 527                 | 660    | 792    | 923    | 1054   | 1186   | 1318    |
| HTD-105 | 770                 | 967    | 1163   | 1350   | 1541   | 1733   | 1926    |
| HTD-125 | 1323                | 1654   | 1985   | 2316   | 2647   | 2977   | 3308    |
| HTD-140 | 1992                | 2489   | 2987   | 3485   | 3983   | 4481   | 4979    |
| HTD-160 | 3067                | 3834   | 4601   | 5368   | 6135   | 6902   | 7669    |
| HTD-190 | 4944                | 6180   | 7415   | 8651   | 9887   | 11123  | 12360   |
| HTD-210 | 6794                | 8492   | 10191  | 11889  | 13587  | 15286  | 16984   |
| HTD-240 | 10649               | 13311  | 15973  | 18636  | 21298  | 23961  | 26623   |
| HTD-270 | 14975               | 18719  | 22463  | 26207  | 29950  | 33694  | 37438   |
| HTD-300 | 18377               | 22975  | 27574  | 32168  | 36762  | 41357  | 45951   |
| HTD-350 | 27517               | 34397  | 41280  | 48163  | 55041  | 61920  | 68803   |
| HTD-400 | 39209               | 49015  | 58822  | 68624  | 78426  | 88229  | 98031   |

Unit: N.m

| Model   | Air Supply Pressure |        |        |        |         |         |
|---------|---------------------|--------|--------|--------|---------|---------|
|         | 3 Bar               | 4 Bar  | 5 Bar  | 6 Bar  | 7 Bar   | 8 Bar   |
| HTD-032 | 4.1                 | 5.9    | 7.4    | 8.8    | 9.8     | 11.3    |
| HTD-052 | 11.6                | 15.5   | 19.3   | 23.2   | 27.1    | 31      |
| HTD-063 | 20.6                | 27.5   | 34.4   | 41.3   | 48.2    | 55      |
| HTD-075 | 33.7                | 44.7   | 55.9   | 67     | 78.2    | 89.3    |
| HTD-083 | 42.3                | 56.4   | 70.5   | 84.6   | 98.7    | 112.9   |
| HTD-092 | 64.8                | 86.5   | 108    | 129.6  | 151.2   | 172.8   |
| HTD-105 | 94.7                | 127.2  | 157.8  | 189.4  | 220.9   | 252.5   |
| HTD-125 | 162.7               | 216.9  | 271.1  | 325.3  | 379.5   | 433.8   |
| HTD-140 | 244.8               | 326.4  | 408    | 489.6  | 571.2   | 652.8   |
| HTD-160 | 377                 | 502.7  | 628.4  | 754.1  | 879.7   | 1005.4  |
| HTD-190 | 607.7               | 810.2  | 1012.8 | 1215.3 | 1417.9  | 1620.4  |
| HTD-210 | 835.1               | 1113.4 | 1391.8 | 1670.1 | 1948.4  | 2226.9  |
| HTD-240 | 1309                | 1745.2 | 2181.6 | 2617.9 | 3054.2  | 3490.5  |
| HTD-270 | 1840.7              | 2454.2 | 3067.8 | 3681.3 | 4294.9  | 4908.5  |
| HTD-300 | 2258.8              | 3012.7 | 3765.6 | 4518.6 | 5271.5  | 6024.5  |
| HTD-350 | 3382.1              | 4510.1 | 5638.1 | 6765.2 | 7893.2  | 9020.2  |
| HTD-400 | 4819.4              | 6426.8 | 8033.2 | 9639.7 | 11246.2 | 12852.6 |



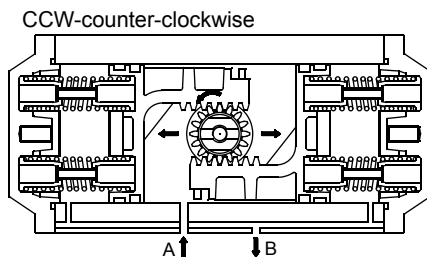
Sizing example of HAITIMA spring return actuator:

Spring to close when air fails(air to open):

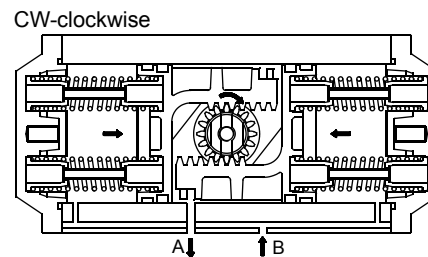
Valve torque 60N.m plus 30% safety factor = 78N.m. Minimum operating pressure: 6bar. The spring return HAITIMA actuator selected is HTS-125-10. The HTS-125-10 has the following output torques:

- 1.air torque 0°(valve close) = 173N.m > 78N.m
- 2.air torque 90°(valve open) = 118N.m > 78N.m
- 3.spring torque 90°(valve open) = 156N.m > 78N.m
- 4.spring torque 0°(valve close) = 119N.m > 78N.m

The operating principle of single acting spring return actuator



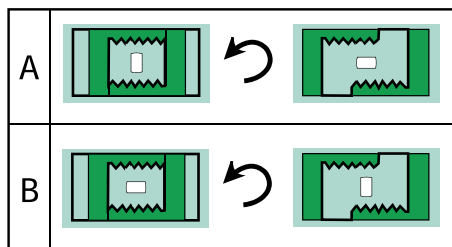
Air to port A forces the pistons outwards, causing the springs to compress. The pinion turns counter-clockwise while air is being exhausted through port B.



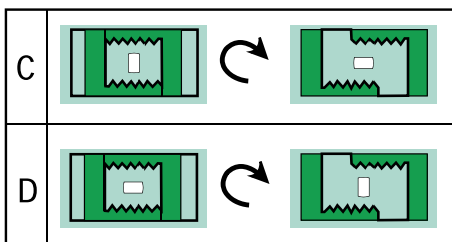
Loss of air pressure through port A allows the stored energy in the springs to force the pistons inwards. The pinion turns clockwise while air is being exhausted through port A.

## Mounting Variations

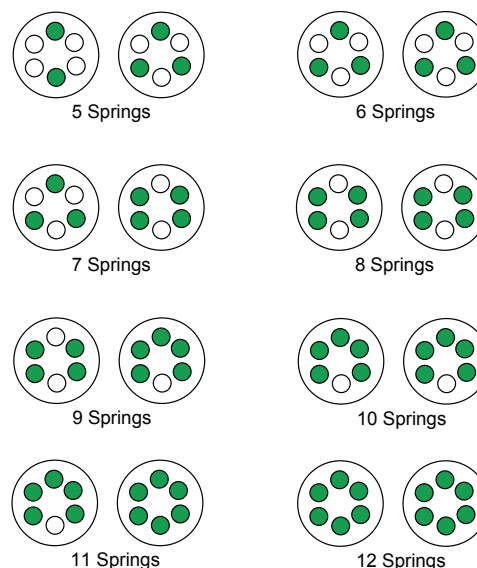
CCW-counter-clockwise



CW-clockwise



## Spring Arrangement



# Pneumatic Actuator -Torque Table(in.lbs)



Unit: in.lbs

| Unit: in.lbs | Spring Set | Spring Torque |      | Air Supply Pressure |     |        |      |        |      |        |      |        |      |        |      |         |      |
|--------------|------------|---------------|------|---------------------|-----|--------|------|--------|------|--------|------|--------|------|--------|------|---------|------|
|              |            |               |      | 40 Psi              |     | 50 Psi |      | 60 Psi |      | 70 Psi |      | 80 Psi |      | 90 Psi |      | 100 Psi |      |
|              |            | 0°            | 90°  | 0°                  | 90° | 0°     | 90°  | 0°     | 90°  | 0°     | 90°  | 0°     | 90°  | 0°     | 90°  | 0°      | 90°  |
| HTS-052      | 5          | 34            | 54   | 61                  | 40  | 84     | 61   | 108    | 83   |        |      |        |      |        |      |         |      |
|              | 6          | 40            | 65   | 54                  | 30  | 78     | 51   | 101    | 73   |        |      |        |      |        |      |         |      |
|              | 7          | 46            | 75   | 49                  | 21  | 72     | 42   | 95     | 64   |        |      |        |      |        |      |         |      |
|              | 8          | 53            | 86   |                     |     | 65     | 33   | 89     | 55   | 112    | 77   | 136    | 98   |        |      |         |      |
|              | 9          | 60            | 97   |                     |     |        |      | 82     | 45   | 106    | 67   | 129    | 88   |        |      |         |      |
|              | 10         | 66            | 108  |                     |     |        |      | 76     | 35   | 99     | 58   | 123    | 79   | 146    | 101  | 169     | 122  |
|              | 11         | 73            | 119  |                     |     |        |      |        |      | 93     | 48   | 116    | 70   | 139    | 91   | 163     | 113  |
| HTS-063      | 12         | 80            | 129  |                     |     |        |      |        |      | 86     | 39   | 109    | 61   | 133    | 82   | 156     | 104  |
|              | 5          | 55            | 97   | 114                 | 69  | 157    | 106  | 200    | 143  |        |      |        |      |        |      |         |      |
|              | 6          | 67            | 116  | 101                 | 53  | 144    | 90   | 187    | 127  |        |      |        |      |        |      |         |      |
|              | 7          | 78            | 136  | 88                  | 38  | 131    | 75   | 175    | 112  |        |      |        |      |        |      |         |      |
|              | 8          | 89            | 155  |                     |     | 120    | 59   | 163    | 95   | 206    | 132  | 250    | 169  |        |      |         |      |
|              | 9          | 100           | 174  |                     |     | 107    | 43   | 150    | 80   | 194    | 117  | 238    | 154  |        |      |         |      |
|              | 10         | 110           | 194  |                     |     |        |      | 140    | 64   | 183    | 101  | 226    | 138  | 270    | 175  | 313     | 212  |
| HTS-075      | 11         | 122           | 213  |                     |     |        |      |        |      | 170    | 85   | 213    | 122  | 257    | 159  | 300     | 196  |
|              | 12         | 133           | 233  |                     |     |        |      |        |      | 158    | 69   | 201    | 106  | 245    | 143  | 288     | 180  |
|              | 5          | 100           | 155  | 177                 | 119 | 246    | 183  | 315    | 248  |        |      |        |      |        |      |         |      |
|              | 6          | 119           | 186  | 157                 | 91  | 226    | 156  | 295    | 220  |        |      |        |      |        |      |         |      |
|              | 7          | 140           | 217  | 136                 | 63  | 205    | 128  | 275    | 192  |        |      |        |      |        |      |         |      |
|              | 8          | 160           | 248  |                     |     | 184    | 99   | 254    | 164  | 324    | 229  | 394    | 294  |        |      |         |      |
|              | 9          | 179           | 279  |                     |     | 165    | 72   | 234    | 136  | 304    | 201  | 374    | 266  |        |      |         |      |
| HTS-083      | 10         | 199           | 310  |                     |     |        |      | 214    | 108  | 284    | 173  | 353    | 238  | 422    | 302  | 492     | 367  |
|              | 11         | 219           | 341  |                     |     |        |      |        |      | 263    | 146  | 333    | 210  | 402    | 274  | 472     | 339  |
|              | 12         | 239           | 372  |                     |     |        |      |        |      | 244    | 118  | 313    | 182  | 382    | 246  | 452     | 311  |
|              | 5          | 122           | 188  | 224                 | 157 | 310    | 238  | 397    | 319  |        |      |        |      |        |      |         |      |
|              | 6          | 146           | 225  | 201                 | 123 | 287    | 204  | 374    | 286  |        |      |        |      |        |      |         |      |
|              | 7          | 171           | 264  | 177                 | 89  | 263    | 170  | 349    | 251  |        |      |        |      |        |      |         |      |
|              | 8          | 195           | 301  |                     |     | 239    | 136  | 325    | 218  | 411    | 300  | 497    | 381  |        |      |         |      |
| HTS-092      | 9          | 219           | 339  |                     |     | 215    | 102  | 301    | 184  | 387    | 265  | 474    | 347  |        |      |         |      |
|              | 10         | 244           | 376  |                     |     |        |      | 277    | 150  | 363    | 232  | 450    | 313  | 536    | 395  | 621     | 476  |
|              | 11         | 268           | 414  |                     |     |        |      |        |      | 340    | 198  | 426    | 280  | 512    | 362  | 598     | 442  |
|              | 12         | 293           | 452  |                     |     |        |      |        |      | 316    | 164  | 402    | 245  | 488    | 326  | 574     | 408  |
|              | 5          | 194           | 289  | 336                 | 241 | 469    | 374  | 601    | 506  |        |      |        |      |        |      |         |      |
|              | 6          | 233           | 347  | 297                 | 183 | 430    | 316  | 562    | 448  |        |      |        |      |        |      |         |      |
|              | 7          | 272           | 405  | 259                 | 125 | 391    | 258  | 524    | 390  |        |      |        |      |        |      |         |      |
| HTS-105      | 8          | 311           | 463  |                     |     | 352    | 200  | 485    | 333  | 617    | 465  | 750    | 598  |        |      |         |      |
|              | 9          | 349           | 521  |                     |     | 313    | 143  | 446    | 275  | 579    | 407  | 711    | 540  |        |      |         |      |
|              | 10         | 388           | 578  |                     |     |        |      | 407    | 217  | 540    | 349  | 672    | 482  | 805    | 615  | 937     | 747  |
|              | 11         | 427           | 636  |                     |     |        |      |        |      | 501    | 292  | 633    | 424  | 766    | 557  | 899     | 689  |
|              | 12         | 466           | 694  |                     |     |        |      |        |      | 462    | 234  | 595    | 366  | 727    | 499  | 860     | 631  |
|              | 5          | 264           | 432  | 502                 | 327 | 703    | 509  | 905    | 690  |        |      |        |      |        |      |         |      |
|              | 6          | 318           | 519  | 446                 | 252 | 647    | 434  | 849    | 615  |        |      |        |      |        |      |         |      |
| HTS-125      | 7          | 370           | 604  | 391                 | 178 | 592    | 359  | 794    | 541  |        |      |        |      |        |      |         |      |
|              | 8          | 423           | 691  |                     |     | 547    | 293  | 736    | 463  | 925    | 634  | 1115   | 805  |        |      |         |      |
|              | 9          | 476           | 775  |                     |     | 491    | 220  | 680    | 390  | 869    | 561  | 1059   | 732  |        |      |         |      |
|              | 10         | 529           | 864  |                     |     |        |      | 625    | 314  | 814    | 484  | 1008   | 659  | 1204   | 835  | 1399    | 1011 |
|              | 11         | 581           | 951  |                     |     |        |      |        |      | 758    | 408  | 953    | 584  | 1148   | 759  | 1342    | 936  |
|              | 12         | 635           | 1036 |                     |     |        |      |        |      | 702    | 333  | 897    | 509  | 1092   | 685  | 1288    | 862  |
|              | 5          | 463           | 738  | 861                 | 575 | 1203   | 889  | 1544   | 1202 |        |      |        |      |        |      |         |      |
| HTS-140      | 6          | 555           | 886  | 760                 | 440 | 1102   | 753  | 1443   | 1066 |        |      |        |      |        |      |         |      |
|              | 7          | 647           | 1033 | 660                 | 307 | 1002   | 619  | 1343   | 931  |        |      |        |      |        |      |         |      |
|              | 8          | 740           | 1181 |                     |     | 900    | 483  | 1242   | 796  | 1583   | 1109 | 1925   | 1422 |        |      |         |      |
|              | 9          | 832           | 1329 |                     |     | 799    | 347  | 1141   | 660  | 1482   | 973  | 1824   | 1286 |        |      |         |      |
|              | 10         | 925           | 1477 |                     |     |        |      | 1040   | 525  | 1381   | 838  | 1723   | 1151 | 2064   | 1464 |         |      |
|              | 11         | 1017          | 1624 |                     |     |        |      |        |      | 1281   | 703  | 1623   | 1016 | 1964   | 1329 | 1925    | 1642 |
|              | 12         | 1110          | 1771 |                     |     |        |      |        |      | 1180   | 568  | 1521   | 881  | 1863   | 1194 | 2204    | 1507 |
| HTS-140      | 5          | 705           | 1110 | 1290                | 876 | 1799   | 1358 | 2308   | 1840 |        |      |        |      |        |      |         |      |
|              | 6          | 846           | 1332 | 1141                | 665 | 1650   | 1148 | 2159   | 1630 |        |      |        |      |        |      |         |      |
|              | 7          | 987           | 1554 | 936                 | 455 | 1476   | 937  | 2017   | 1420 |        |      |        |      |        |      |         |      |
|              | 8          | 1128          | 1776 |                     |     | 1353   | 728  | 1861   | 1209 | 2370   | 1691 | 2878   | 2172 |        |      |         |      |
|              | 9          | 1269          | 1998 |                     |     | 1204   | 517  | 1713   | 999  | 2221   | 1480 | 2729   | 1962 |        |      |         |      |
|              | 10         | 1410          | 2219 |                     |     |        |      | 1564   | 789  | 2072   | 1270 | 2581   | 1752 | 3089   | 2233 | 3603    | 2715 |
|              | 11         | 1551          | 2441 |                     |     |        |      |        |      | 1923   | 1060 | 2432   | 1542 | 2940   | 2023 | 3449    | 2506 |
| HTS-140      | 12         | 1692          | 2663 |                     |     |        |      |        |      | 1775   | 850  | 2283   | 1331 | 2791   | 1813 | 3300    | 2295 |

# Pneumatic Actuator -Torque Table(in.lbs)



Unit: in.lbs

| Unit: in.lbs | Spring Set | Spring Torque |       | Air Supply Pressure |       |        |       |        |       |        |       |        |       |        |       |         |       |
|--------------|------------|---------------|-------|---------------------|-------|--------|-------|--------|-------|--------|-------|--------|-------|--------|-------|---------|-------|
|              |            |               |       | 40 Psi              |       | 50 Psi |       | 60 Psi |       | 70 Psi |       | 80 Psi |       | 90 Psi |       | 100 Psi |       |
|              |            | 0°            | 90°   | 0°                  | 90°   | 0°     | 90°   | 0°     | 90°   | 0°     | 90°   | 0°     | 90°   | 0°     | 90°   | 0°      | 90°   |
| HTS-160      | 5          | 1099          | 1697  | 1973                | 1370  | 2756   | 2137  | 3539   | 2904  |        |       |        |       |        |       |         |       |
|              | 6          | 1319          | 2037  | 1741                | 1030  | 2524   | 1797  | 3307   | 2564  |        |       |        |       |        |       |         |       |
|              | 7          | 1539          | 2377  | 1509                | 691   | 2292   | 1458  | 3076   | 2225  |        |       |        |       |        |       |         |       |
|              | 8          | 1759          | 2716  | 1277                | 370   | 2060   | 1127  | 2844   | 1885  | 3627   | 2651  | 4410   | 3418  |        |       |         |       |
|              | 9          | 1979          | 3055  |                     |       | 1829   | 779   | 2612   | 1546  | 3395   | 2313  | 4178   | 3079  |        |       |         |       |
|              | 10         | 2198          | 3395  |                     |       |        |       | 2380   | 1206  | 3163   | 1973  | 3946   | 2740  | 4729   | 3507  | 5512    | 4274  |
|              | 11         | 2418          | 3734  |                     |       |        |       |        |       | 2931   | 1634  | 3714   | 2401  | 4497   | 3168  | 5281    | 3934  |
| HTS-190      | 12         | 2638          | 4074  |                     |       |        |       |        |       | 2699   | 1294  | 3482   | 2061  | 4265   | 2828  | 5049    | 3595  |
|              | 5          | 1732          | 2741  | 3202                | 2136  | 4464   | 3320  | 5726   | 4503  |        |       |        |       |        |       |         |       |
|              | 6          | 2078          | 3289  | 2832                | 1617  | 4094   | 2801  | 5357   | 3984  |        |       |        |       |        |       |         |       |
|              | 7          | 2424          | 3837  | 2462                | 1098  | 3725   | 2281  | 4987   | 3465  |        |       |        |       |        |       |         |       |
|              | 8          | 2771          | 4385  |                     |       | 3355   | 1762  | 4618   | 2945  | 5880   | 4129  | 7142   | 5312  |        |       |         |       |
|              | 9          | 3117          | 4933  |                     |       | 2987   | 1243  | 4249   | 2426  | 5511   | 3610  | 6774   | 4793  |        |       |         |       |
|              | 10         | 3463          | 5481  |                     |       |        |       | 3879   | 1907  | 5142   | 3090  | 6404   | 4274  | 7666   | 5457  | 8929    | 6641  |
| HTS-210      | 11         | 3809          | 6030  |                     |       |        |       |        |       | 4772   | 2571  | 6034   | 3754  | 7297   | 4938  | 8559    | 6121  |
|              | 12         | 4156          | 6578  |                     |       |        |       |        |       | 4402   | 2052  | 5665   | 3235  | 6927   | 4419  | 8190    | 5602  |
|              | 5          | 2380          | 3725  | 4400                | 3036  | 6135   | 4717  | 7869   | 6397  |        |       |        |       |        |       |         |       |
|              | 6          | 2856          | 4470  | 3892                | 2299  | 5627   | 3982  | 7361   | 5665  |        |       |        |       |        |       |         |       |
|              | 7          | 3332          | 5215  | 3385                | 1562  | 5119   | 3243  | 6854   | 4923  |        |       |        |       |        |       |         |       |
|              | 8          | 3808          | 5959  |                     |       | 4611   | 2588  | 6346   | 4166  | 8080   | 5744  | 9815   | 7322  |        |       |         |       |
|              | 9          | 4283          | 6730  |                     |       | 4104   | 1744  | 5839   | 3424  | 7573   | 5105  | 9308   | 6785  |        |       |         |       |
| HTS-240      | 10         | 4760          | 7449  |                     |       |        |       | 5331   | 2712  | 7065   | 4393  | 8800   | 6073  | 10534  | 7753  |         |       |
|              | 11         | 5236          | 8195  |                     |       |        |       |        |       | 6557   | 3655  | 8292   | 5335  | 10026  | 7016  | 11761   | 8696  |
|              | 12         | 5711          | 8939  |                     |       |        |       |        |       | 6050   | 2919  | 7784   | 4599  | 9519   | 6279  | 11253   | 7959  |
|              | 5          | 3814          | 5778  | 6620                | 4861  | 9890   | 7551  | 13160  | 10241 |        |       |        |       |        |       |         |       |
|              | 6          | 4580          | 6933  | 6033                | 3681  | 8723   | 6371  | 11413  | 9061  |        |       |        |       |        |       |         |       |
|              | 7          | 5339          | 8089  | 5249                | 2500  | 7940   | 5190  | 10630  | 7881  |        |       |        |       |        |       |         |       |
|              | 8          | 6102          | 9244  |                     |       | 7151   | 4010  | 9842   | 6700  | 12533  | 9391  | 15224  | 12082 |        |       |         |       |
| HTS-270      | 9          | 6865          | 10400 |                     |       | 6364   | 2829  | 9054   | 5520  | 11745  | 8211  | 14436  | 10902 |        |       |         |       |
|              | 10         | 7628          | 11555 |                     |       |        |       | 8267   | 4340  | 10957  | 7031  | 13648  | 9721  | 16339  | 12412 | 19029   | 15102 |
|              | 11         | 8391          | 12711 |                     |       |        |       |        |       | 10170  | 5850  | 12861  | 8541  | 15551  | 11232 | 18241   | 13922 |
|              | 12         | 9154          | 13866 |                     |       |        |       |        |       | 9382   | 4670  | 12073  | 7361  | 14764  | 10051 | 17454   | 12742 |
|              | 5          | 5420          | 8123  | 9599                | 6909  | 13382  | 10732 | 17166  | 14556 |        |       |        |       |        |       |         |       |
|              | 6          | 6503          | 9748  | 8492                | 5232  | 12275  | 9055  | 16059  | 12879 |        |       |        |       |        |       |         |       |
|              | 7          | 7587          | 11372 | 7384                | 3555  | 11168  | 7378  | 14951  | 11202 |        |       |        |       |        |       |         |       |
| HTS-300      | 8          | 8671          | 12997 |                     |       | 10061  | 5701  | 13844  | 9525  | 17628  | 13348 | 21411  | 17171 |        |       |         |       |
|              | 9          | 9755          | 14622 |                     |       | 8953   | 4024  | 12737  | 7848  | 16520  | 11671 | 20304  | 15494 |        |       |         |       |
|              | 10         | 10839         | 16246 |                     |       |        |       | 12353  | 6171  | 15559  | 9994  | 19197  | 13817 | 22980  | 17640 | 26764   | 21464 |
|              | 11         | 11923         | 17871 |                     |       |        |       |        |       | 14306  | 8317  | 18090  | 12140 | 21874  | 15963 | 25657   | 19787 |
|              | 12         | 13007         | 19495 |                     |       |        |       |        |       | 13199  | 6640  | 16982  | 10463 | 20766  | 14286 | 24549   | 18110 |
|              | 5          | 6448          | 10114 | 11867               | 8035  | 16418  | 12097 |        |       |        |       |        |       |        |       |         |       |
|              | 6          | 7735          | 12128 | 10608               | 6404  | 15159  | 10466 |        |       |        |       |        |       |        |       |         |       |
| HTS-350      | 7          | 9021          | 14141 | 9349                | 4774  | 13900  | 8835  | 18451  | 12897 |        |       |        |       |        |       |         |       |
|              | 8          | 10307         | 16164 | 8089                | 3136  | 12641  | 7197  | 17190  | 11258 | 21736  | 15315 | 26281  | 19371 |        |       |         |       |
|              | 9          | 11602         | 18178 |                     |       | 11378  | 5571  | 15923  | 9628  | 20468  | 13684 | 25014  | 17741 |        |       |         |       |
|              | 10         | 12888         | 20210 |                     |       | 10118  | 3926  | 14664  | 7982  | 19209  | 12039 | 23755  | 16096 | 28300  | 20152 | 32845   | 24209 |
|              | 11         | 14174         | 22223 |                     |       |        |       |        |       | 17950  | 10408 | 22495  | 14465 | 27041  | 18522 | 31586   | 22578 |
|              | 12         | 15469         | 24246 |                     |       |        |       |        |       | 16691  | 8779  | 21236  | 12830 | 25782  | 16882 | 30334   | 20940 |
|              | 5          | 9485          | 15190 | 18001               | 12103 | 25176  | 18693 |        |       |        |       |        |       |        |       |         |       |
| HTS-400      | 6          | 11379         | 18223 | 15867               | 9260  | 23043  | 15850 |        |       |        |       |        |       |        |       |         |       |
|              | 7          | 13273         | 21256 | 13734               | 6416  | 20910  | 13006 | 28085  | 19596 |        |       |        |       |        |       |         |       |
|              | 8          | 15175         | 24297 | 11592               | 3565  | 18767  | 10155 | 25943  | 16745 | 33119  | 23335 | 40294  | 29925 |        |       |         |       |
|              | 9          | 17077         | 27330 |                     |       | 16625  | 7312  | 23801  | 13901 | 30977  | 20491 | 38152  | 27081 |        |       |         |       |
|              | 10         | 18963         | 30372 |                     |       | 14501  | 4460  | 21676  | 11050 | 28852  | 17640 | 36023  | 24226 | 43193  | 30810 | 50370   | 37402 |
|              | 11         | 20857         | 33396 |                     |       |        |       |        |       | 26711  | 14798 | 33881  | 21382 | 41051  | 27967 | 48228   | 34558 |
|              | 12         | 22751         | 36421 |                     |       |        |       |        |       | 24579  | 11953 | 31743  | 18543 | 38907  | 25133 | 46086   | 31723 |
| HTS-400      | 5          | 14008         | 24049 | 25198               | 15923 | 35006  | 25001 |        |       |        |       |        |       |        |       |         |       |
|              | 6          | 16596         | 28184 | 22611               | 11519 | 32419  | 20597 |        |       |        |       |        |       |        |       |         |       |
|              | 7          | 19174         | 32311 | 20033               | 7893  | 29841  | 16971 | 39649  | 26048 |        |       |        |       |        |       |         |       |
|              | 8          | 21753         | 36455 | 17454               | 4251  | 27262  | 13329 | 37069  | 22405 | 46871  | 31478 | 56673  | 40550 |        |       |         |       |
|              | 9          | 24340         | 40581 |                     |       | 24679  | 9707  | 34482  | 18779 | 44284  | 27851 | 54086  | 36924 |        |       |         |       |
|              | 10         | 26919         | 44725 |                     |       | 22101  | 6065  | 31903  | 15137 | 41705  | 24210 | 51507  | 33282 | 61310  | 42354 | 71112   | 51427 |
|              | 11         | 29514         | 48852 |                     |       |        |       |        |       | 39110  | 20583 | 48912  | 29656 | 58714  | 38728 | 68516   | 47800 |
|              | 12         | 32093         | 52978 |                     |       |        |       |        |       | 36514  | 16966 | 46317  | 26033 | 56119  | 35100 | 65936   | 44181 |

# Pneumatic Actuator -Torque Table(Nm)



Unit: N.m

| Unit: in.lbs | Spring Set | Spring Torque |       | Air Supply Pressure |       |       |       |       |       |       |       |       |       |
|--------------|------------|---------------|-------|---------------------|-------|-------|-------|-------|-------|-------|-------|-------|-------|
|              |            |               |       | 3 Bar               |       | 4 Bar |       | 5 Bar |       | 6 Bar |       | 7 Bar |       |
|              |            | 0°            | 90°   | 0°                  | 90°   | 0°    | 90°   | 0°    | 90°   | 0°    | 90°   | 0°    | 90°   |
| HTS-052      | 5          | 3.8           | 6.1   | 7.8                 | 5.3   | 11.6  | 8.9   |       |       |       |       |       |       |
|              | 6          | 4.6           | 7.4   | 7.1                 | 4.2   | 10.9  | 7.8   |       |       |       |       |       |       |
|              | 7          | 5.2           | 8.5   | 6.4                 | 3.2   | 10.2  | 6.7   |       |       |       |       |       |       |
|              | 8          | 6.0           | 9.7   |                     |       | 9.5   | 5.7   | 13.3  | 9.3   |       |       |       |       |
|              | 9          | 6.7           | 11.0  |                     |       | 8.8   | 4.6   | 12.6  | 8.2   |       |       |       |       |
|              | 10         | 7.5           | 12.2  |                     |       | 8.0   | 3.5   | 11.9  | 7.1   | 15.7  | 10.7  |       |       |
|              | 11         | 8.3           | 13.4  |                     |       |       |       | 11.1  | 6.0   | 15.0  | 9.6   | 18.8  | 13.1  |
| HTS-063      | 12         | 9.0           | 14.6  |                     |       |       |       | 10.4  | 5.0   | 14.2  | 8.6   | 18.1  | 12.1  |
|              | 5          | 6.2           | 11.0  | 14.6                | 9.3   | 21.6  | 15.4  | 28.7  | 21.4  |       |       |       |       |
|              | 6          | 7.6           | 13.1  | 13.1                | 7.5   | 20.2  | 13.5  | 27.3  | 19.7  |       |       |       |       |
|              | 7          | 8.8           | 15.3  | 11.6                | 5.7   | 18.8  | 11.8  | 25.9  | 17.8  |       |       |       |       |
|              | 8          | 10.1          | 17.6  |                     |       | 17.5  | 10.0  | 24.5  | 16.0  | 31.6  | 22.1  |       |       |
|              | 9          | 11.3          | 19.7  |                     |       | 16.0  | 8.2   | 23.2  | 14.3  | 30.3  | 20.4  |       |       |
|              | 10         | 12.5          | 21.9  |                     |       | 14.8  | 6.4   | 21.9  | 12.5  | 29.0  | 18.5  | 36.1  | 24.6  |
| HTS-075      | 11         | 13.8          | 24.1  |                     |       | 13.4  | 4.6   | 20.5  | 10.7  | 27.5  | 16.8  | 34.6  | 22.8  |
|              | 12         | 15.0          | 26.3  |                     |       |       |       | 19.1  | 8.9   | 26.2  | 14.9  | 33.3  | 21.0  |
|              | 5          | 11.3          | 17.5  | 22.7                | 16.0  | 34.0  | 26.6  |       |       |       |       |       |       |
|              | 6          | 13.5          | 21.0  | 20.5                | 12.9  | 31.8  | 23.4  |       |       |       |       |       |       |
|              | 7          | 15.8          | 24.5  | 18.1                | 9.7   | 29.5  | 20.3  |       |       |       |       |       |       |
|              | 8          | 18.1          | 28.0  |                     |       | 27.2  | 17.1  | 38.6  | 27.7  |       |       |       |       |
|              | 9          | 20.2          | 31.5  |                     |       | 24.9  | 14.0  | 36.4  | 24.6  |       |       |       |       |
| HTS-083      | 10         | 22.5          | 35.0  |                     |       | 22.6  | 10.8  | 34.0  | 21.4  | 45.4  | 32.0  | 56.8  | 42.6  |
|              | 11         | 24.8          | 38.5  |                     |       |       |       | 31.7  | 18.3  | 43.1  | 28.8  | 54.5  | 39.4  |
|              | 12         | 27.0          | 42.0  |                     |       |       |       | 29.5  | 15.1  | 40.8  | 25.7  | 52.3  | 36.3  |
|              | 5          | 13.8          | 21.3  | 28.7                | 20.9  | 42.9  | 34.2  |       |       |       |       |       |       |
|              | 6          | 16.5          | 25.5  | 26.1                | 17.2  | 40.3  | 30.4  |       |       |       |       |       |       |
|              | 7          | 19.3          | 29.8  | 23.4                | 13.3  | 37.5  | 26.6  |       |       |       |       |       |       |
|              | 8          | 22.0          | 34.0  |                     |       | 34.8  | 22.8  | 48.9  | 36.2  |       |       |       |       |
| HTS-092      | 9          | 24.8          | 38.3  |                     |       | 32.1  | 18.9  | 46.2  | 32.3  |       |       |       |       |
|              | 10         | 27.6          | 42.5  |                     |       | 29.4  | 15.1  | 43.5  | 28.5  | 57.7  | 41.9  | 71.7  | 55.2  |
|              | 11         | 30.3          | 46.7  |                     |       |       |       | 40.8  | 24.7  | 55.0  | 38.1  | 69.0  | 51.4  |
|              | 12         | 33.1          | 51.1  |                     |       |       |       | 38.1  | 20.9  | 52.3  | 34.1  | 66.3  | 47.5  |
|              | 5          | 21.9          | 32.7  | 43.2                | 32.5  | 65.0  | 54.2  |       |       |       |       |       |       |
|              | 6          | 26.3          | 39.2  | 38.9                | 26.0  | 60.6  | 47.7  |       |       |       |       |       |       |
|              | 7          | 30.7          | 45.8  | 34.5                | 19.4  | 56.2  | 41.1  |       |       |       |       |       |       |
| HTS-092      | 8          | 35.1          | 52.3  |                     |       | 51.8  | 34.6  | 73.5  | 56.3  |       |       |       |       |
|              | 9          | 39.5          | 58.8  |                     |       | 47.4  | 28.1  | 69.1  | 49.8  |       |       |       |       |
|              | 10         | 43.9          | 65.4  |                     |       | 43.0  | 21.5  | 64.8  | 43.3  | 86.5  | 65.0  | 108.2 | 86.7  |
|              | 11         | 48.2          | 71.9  |                     |       |       |       | 60.4  | 36.7  | 82.1  | 58.4  | 103.8 | 80.2  |
|              | 12         | 52.6          | 78.4  |                     |       |       |       | 56.0  | 30.2  | 77.7  | 51.9  | 99.4  | 73.6  |
|              | 5          | 29.9          | 48.8  | 64.7                | 44.2  | 97.7  | 74.0  |       |       |       |       |       |       |
|              | 6          | 35.9          | 58.6  | 58.4                | 35.7  | 91.4  | 65.5  |       |       |       |       |       |       |
| HTS-105      | 7          | 41.9          | 68.3  | 52.1                | 27.3  | 85.2  | 57.0  |       |       |       |       |       |       |
|              | 8          | 47.8          | 78.1  |                     |       | 78.9  | 48.5  | 110.0 | 76.5  |       |       |       |       |
|              | 9          | 53.8          | 87.6  |                     |       | 72.6  | 40.3  | 103.6 | 68.3  |       |       |       |       |
|              | 10         | 59.8          | 97.6  |                     |       | 66.4  | 31.6  | 97.4  | 59.6  | 129.5 | 88.4  | 161.4 | 117.3 |
|              | 11         | 65.7          | 107.4 |                     |       |       |       | 91.2  | 51.1  | 123.2 | 79.9  | 155.0 | 108.8 |
|              | 12         | 71.7          | 117.1 |                     |       |       |       | 84.9  | 42.7  | 116.8 | 71.5  | 148.9 | 100.4 |
|              | 5          | 52.3          | 83.4  | 110.9               | 77.4  | 166.8 | 128.7 |       |       |       |       |       |       |
| HTS-125      | 6          | 62.7          | 100.1 | 99.5                | 62.1  | 155.4 | 113.4 |       |       |       |       |       |       |
|              | 7          | 73.1          | 116.7 | 88.1                | 47.1  | 144.1 | 98.2  |       |       |       |       |       |       |
|              | 8          | 83.6          | 133.4 |                     |       | 132.7 | 82.9  | 188.6 | 134.2 |       |       |       |       |
|              | 9          | 94.1          | 150.1 |                     |       | 121.2 | 67.6  | 177.2 | 118.9 |       |       |       |       |
|              | 10         | 104.5         | 166.8 |                     |       | 109.8 | 52.3  | 165.8 | 103.6 | 221.8 | 154.9 |       |       |
|              | 11         | 114.9         | 183.5 |                     |       |       |       | 154.5 | 88.4  | 210.4 | 139.7 | 218.4 | 191.0 |
|              | 12         | 125.4         | 200.2 |                     |       |       |       | 143.0 | 73.0  | 199.0 | 124.3 | 254.9 | 175.6 |
| HTS-140      | 5          | 79.7          | 125.4 | 166.0               | 118.1 | 249.4 | 197.1 |       |       |       |       |       |       |
|              | 6          | 95.6          | 150.5 | 149.2               | 94.3  | 232.6 | 173.3 |       |       |       |       |       |       |
|              | 7          | 111.5         | 175.6 | 127.2               | 70.6  | 215.7 | 149.6 |       |       |       |       |       |       |
|              | 8          | 127.4         | 200.6 |                     |       | 198.9 | 125.8 | 282.2 | 204.8 |       |       |       |       |
|              | 9          | 143.4         | 225.7 |                     |       | 182.1 | 102.1 | 265.4 | 181.0 |       |       |       |       |
|              | 10         | 159.3         | 250.8 |                     |       | 165.3 | 78.3  | 248.6 | 157.2 | 331.9 | 236.2 | 415.9 | 315.1 |
|              | 11         | 175.2         | 275.9 |                     |       |       |       | 231.8 | 133.5 | 315.1 | 212.4 | 398.5 | 291.4 |
| HTS-140      | 12         | 191.2         | 301.0 |                     |       |       |       | 215.0 | 109.7 | 298.3 | 188.6 | 381.7 | 267.7 |

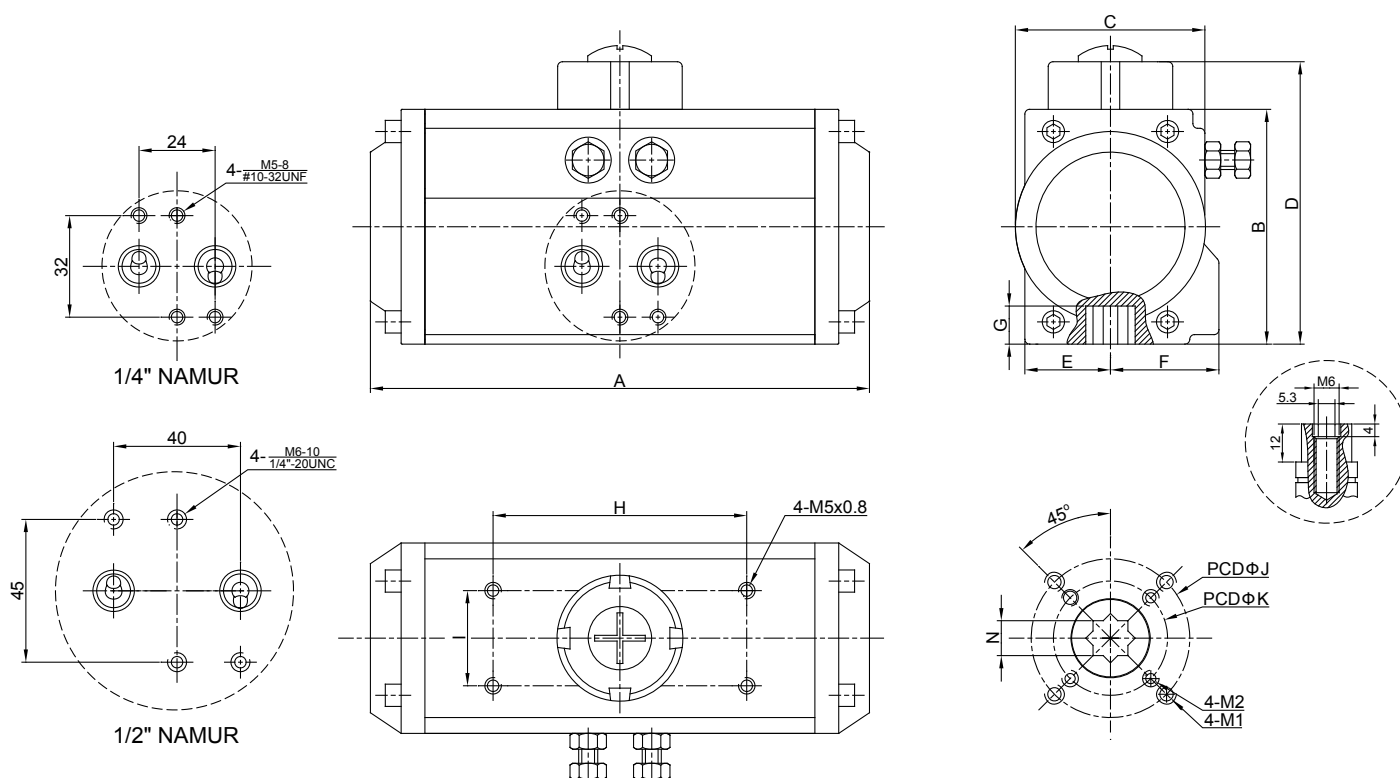
# Pneumatic Actuator –Torque Table(Nm)



Unit: N.m

| Unit: in.lbs | Spring Set | Spring Torque |        | Air Supply Pressure |       |        |        |        |        |        |        |        |        |
|--------------|------------|---------------|--------|---------------------|-------|--------|--------|--------|--------|--------|--------|--------|--------|
|              |            |               |        | 3 Bar               |       | 4 Bar  |        | 5 Bar  |        | 6 Bar  |        | 7 Bar  |        |
|              |            | 0°            | 90°    | 0°                  | 90°   | 0°     | 90°    | 0°     | 90°    | 0°     | 90°    | 0°     | 90°    |
| HTS-160      | 5          | 124.2         | 191.8  | 254.0               | 185.3 | 382.4  | 311.0  |        |        |        |        |        |        |
|              | 6          | 149.1         | 230.2  | 227.8               | 146.8 | 356.2  | 272.5  |        |        |        |        |        |        |
|              | 7          | 173.9         | 268.6  | 201.6               | 108.5 | 330.0  | 234.2  |        |        |        |        |        |        |
|              | 8          | 198.7         | 306.9  | 175.4               | 71.8  | 303.7  | 195.8  | 432.1  | 321.4  |        |        |        |        |
|              | 9          | 223.6         | 345.3  |                     |       | 277.5  | 157.5  | 405.9  | 283.1  |        |        |        |        |
|              | 10         | 248.4         | 383.6  |                     |       | 251.3  | 119.1  | 379.7  | 244.8  | 508.0  | 370.5  |        |        |
|              | 11         | 273.3         | 422.0  |                     |       |        |        | 353.5  | 206.4  | 481.8  | 332.1  | 610.2  | 457.8  |
| HTS-190      | 12         | 298.1         | 460.3  |                     |       |        |        | 327.3  | 168.1  | 455.6  | 293.8  | 584.0  | 419.4  |
|              | 5          | 195.7         | 309.7  | 411.8               | 288.4 | 618.7  | 482.3  |        |        |        |        |        |        |
|              | 6          | 234.8         | 371.6  | 370.1               | 229.7 | 577.0  | 423.6  |        |        |        |        |        |        |
|              | 7          | 274.0         | 433.6  | 328.3               | 171.0 | 535.2  | 365.0  |        |        |        |        |        |        |
|              | 8          | 313.1         | 495.5  |                     |       | 493.4  | 306.3  | 700.3  | 500.2  |        |        |        |        |
|              | 9          | 352.2         | 557.5  |                     |       | 451.8  | 247.6  | 658.7  | 441.5  |        |        |        |        |
|              | 10         | 391.3         | 619.4  |                     |       | 410.0  | 188.9  | 616.9  | 382.9  | 823.8  | 576.8  | 1030.7 | 770.8  |
| HTS-210      | 11         | 430.5         | 681.3  |                     |       |        |        | 575.1  | 324.2  | 782.0  | 518.1  | 988.9  | 712.1  |
|              | 12         | 469.6         | 743.3  |                     |       |        |        | 533.4  | 265.5  | 740.3  | 459.5  | 947.1  | 653.4  |
|              | 5          | 268.9         | 420.9  | 566.0               | 409.8 | 850.3  | 685.1  |        |        |        |        |        |        |
|              | 6          | 322.7         | 505.1  | 508.6               | 326.5 | 792.9  | 602.4  |        |        |        |        |        |        |
|              | 7          | 376.5         | 589.3  | 451.3               | 243.2 | 735.6  | 518.6  |        |        |        |        |        |        |
|              | 8          | 430.3         | 673.4  |                     |       | 678.1  | 435.3  | 962.4  | 694.0  |        |        |        |        |
|              | 9          | 484.0         | 760.5  |                     |       | 620.8  | 349.2  | 905.1  | 624.6  |        |        |        |        |
| HTS-240      | 10         | 537.8         | 841.8  |                     |       | 563.4  | 268.8  | 847.7  | 544.1  | 1131.9 | 819.5  | 1416.2 | 1094.9 |
|              | 11         | 591.7         | 926.0  |                     |       |        |        | 790.3  | 460.8  | 1074.5 | 736.2  | 1358.8 | 1011.6 |
|              | 12         | 645.3         | 1010.1 |                     |       |        |        | 733.0  | 377.6  | 1017.2 | 653.0  | 1301.5 | 928.3  |
|              | 5          | 431.0         | 652.9  | 877.8               | 656.0 | 1413.7 | 1096.9 |        |        |        |        |        |        |
|              | 6          | 517.6         | 783.4  | 788.4               | 522.6 | 1229.3 | 963.5  |        |        |        |        |        |        |
|              | 7          | 603.3         | 914.0  | 699.9               | 389.2 | 1140.8 | 830.1  |        |        |        |        |        |        |
|              | 8          | 689.5         | 1044.6 |                     |       | 1051.7 | 696.7  | 1492.7 | 1137.7 |        |        |        |        |
| HTS-270      | 9          | 775.7         | 1175.1 |                     |       | 962.7  | 563.4  | 1403.7 | 1004.3 |        |        |        |        |
|              | 10         | 861.9         | 1305.7 |                     |       | 873.7  | 430.0  | 1314.7 | 871.0  | 1755.7 | 1312.0 | 2196.6 | 1752.8 |
|              | 11         | 948.2         | 1436.3 |                     |       |        |        | 1225.7 | 737.6  | 1666.7 | 1178.6 | 2107.6 | 1619.5 |
|              | 12         | 1034.4        | 1566.9 |                     |       |        |        | 1136.7 | 604.2  | 1577.7 | 1045.2 | 2018.6 | 1486.1 |
|              | 5          | 612.4         | 917.9  | 1234.7              | 932.4 | 1854.8 | 1558.9 |        |        |        |        |        |        |
|              | 6          | 734.9         | 1101.5 | 1109.6              | 742.8 | 1729.7 | 1369.4 |        |        |        |        |        |        |
|              | 7          | 857.4         | 1285.1 | 984.5               | 553.3 | 1604.6 | 1179.9 |        |        |        |        |        |        |
| HTS-300      | 8          | 979.8         | 1468.7 |                     |       | 1479.4 | 990.4  | 2099.5 | 1617.0 |        |        |        |        |
|              | 9          | 1102.3        | 1652.2 |                     |       | 1354.3 | 800.9  | 1974.4 | 1427.5 |        |        |        |        |
|              | 10         | 1224.8        | 1835.8 |                     |       | 1323.9 | 611.4  | 1849.3 | 1238.0 | 2469.3 | 1864.6 | 3089.4 | 2491.2 |
|              | 11         | 1347.3        | 2019.4 |                     |       |        |        | 1724.2 | 1048.5 | 2344.3 | 1675.1 | 2964.3 | 2301.7 |
|              | 12         | 1469.8        | 2203.0 |                     |       |        |        | 1599.0 | 859.0  | 2219.1 | 1485.6 | 2839.2 | 2112.2 |
|              | 5          | 729           | 1143   | 1521                | 1069  |        |        |        |        |        |        |        |        |
|              | 6          | 874           | 1370   | 1379                | 885   |        |        |        |        |        |        |        |        |
| HTS-350      | 7          | 1019          | 1598   | 1237                | 701   | 1983   | 1366   |        |        |        |        |        |        |
|              | 8          | 1165          | 1827   | 1095                | 515   | 1840   | 1181   | 2585   | 1846   |        |        |        |        |
|              | 9          | 1311          | 2054   |                     |       | 1697   | 997    | 2442   | 1662   | 3187   | 2326   |        |        |
|              | 10         | 1456          | 2284   |                     |       | 1555   | 811    | 2300   | 1476   | 3045   | 2141   | 3790   | 2805   |
|              | 11         | 1602          | 2511   |                     |       |        |        | 2158   | 1291   | 2903   | 1956   | 3647   | 2621   |
|              | 12         | 1748          | 2740   |                     |       |        |        | 2015   | 1107   | 2760   | 1771   | 3506   | 2436   |
|              | 5          | 1072          | 1716   | 2319                | 1629  |        |        |        |        |        |        |        |        |
| HTS-400      | 6          | 1286          | 2059   | 2078                | 1308  |        |        |        |        |        |        |        |        |
|              | 7          | 1500          | 2402   | 1837                | 986   | 3013   | 2066   |        |        |        |        |        |        |
|              | 8          | 1715          | 2746   | 1594                | 664   | 2770   | 1744   | 3946   | 2824   |        |        |        |        |
|              | 9          | 1930          | 3088   |                     |       | 2528   | 1423   | 3704   | 2503   | 4879   | 3582   |        |        |
|              | 10         | 2143          | 3432   |                     |       | 2288   | 1101   | 3464   | 2181   | 4639   | 3260   | 5815   | 4340   |
|              | 11         | 2357          | 3774   |                     |       |        |        | 3222   | 1859   | 4397   | 2939   | 5573   | 4019   |
|              | 12         | 2571          | 4116   |                     |       |        |        | 2981   | 1538   | 4155   | 2618   | 5331   | 3698   |
| HTS-400      | 5          | 1583          | 2718   | 3236                | 2159  |        |        |        |        |        |        |        |        |
|              | 6          | 1875          | 3185   | 2944                | 1662  |        |        |        |        |        |        |        |        |
|              | 7          | 2167          | 3651   | 2653                | 1252  | 4260   | 2740   |        |        |        |        |        |        |
|              | 8          | 2458          | 4119   | 2361                | 840   | 3969   | 2328   | 5575   | 3815   |        |        |        |        |
|              | 9          | 2750          | 4586   |                     |       | 3676   | 1918   | 5283   | 3405   | 6889   | 4892   |        |        |
|              | 10         | 3042          | 5054   |                     |       | 3385   | 1507   | 4991   | 2994   | 6598   | 4481   | 8204   | 5967   |
|              | 11         | 3335          | 5520   |                     |       |        |        | 4698   | 2584   | 6305   | 4071   | 7911   | 5558   |
| HTS-400      | 12         | 3627          | 5987   |                     |       |        |        | 4405   | 2175   | 6011   | 3661   | 7620   | 5149   |

# Pneumatic Actuator – Dimension Table



**Dimension Table**

Unit: mm  
inch

| Model  | A     | B     | C     | D     | E     | F     | G    | H    | I    | N    | J   | K   | M1          | M2          | Air Inlet  |
|--------|-------|-------|-------|-------|-------|-------|------|------|------|------|-----|-----|-------------|-------------|------------|
| HT-032 | 114   | 46    | 47    | 65    | 23.5  | 23.5  | 11   | 50   | 25   | 9    | F03 | --  | M5x8        | --          | 1/8"       |
|        | 4.49  | 1.81  | 1.85  | 2.56  | 0.93  | 0.93  | 0.43 | 1.97 | 0.98 | 0.35 |     |     | #10-24UNC   |             |            |
| HT-052 | 158   | 74    | 60    | 94    | 30    | 41    | 14   | 80   | 30   | 11   | F05 | F03 | M6x11       | M5x10       | 1/8"or1/4" |
|        | 6.22  | 2.91  | 2.36  | 3.7   | 1.18  | 1.61  | 0.55 | 3.15 | 1.18 | 0.43 |     |     | 1/4"-20UNC  | #10-24UNC   |            |
| HT-063 | 190   | 88    | 69    | 108   | 36    | 45    | 18   | 80   | 30   | 14   | F07 | F05 | M8x15       | M6x12       | 1/8"or1/4" |
|        | 7.48  | 3.46  | 2.72  | 4.25  | 1.42  | 1.77  | 0.71 | 3.15 | 1.18 | 0.55 |     |     | 5/16"-18UNC | 1/4"-20UNC  |            |
| HT-075 | 206   | 100   | 79    | 120   | 42    | 52    | 20   | 80   | 30   | 14   | F07 | F05 | M8x13       | M6x11       | 1/8"or1/4" |
|        | 8.11  | 3.94  | 3.11  | 4.72  | 1.65  | 2.05  | 0.79 | 3.15 | 1.18 | 0.55 |     |     | 5/16"-18UNC | 1/4"-20UNC  |            |
| HT-083 | 213   | 109   | 88    | 129   | 46    | 52.5  | 20   | 80   | 30   | 17   | F07 | F05 | M8x15       | M6x12       | 1/8"or1/4" |
|        | 8.39  | 4.29  | 3.46  | 5.08  | 1.81  | 2.07  | 0.79 | 3.15 | 1.18 | 0.67 |     |     | 5/16"-18UNC | 1/4"-20UNC  |            |
| HT-092 | 259   | 120   | 97.5  | 140   | 51    | 57.5  | 22   | 80   | 30   | 17   | F07 | F05 | M8x13       | M6x12       | 1/8"or1/4" |
|        | 10.2  | 4.72  | 3.84  | 5.51  | 2.01  | 2.26  | 0.87 | 3.15 | 1.18 | 0.67 |     |     | 5/16"-18UNC | 1/4"-20UNC  |            |
| HT-105 | 284   | 133   | 105.5 | 153   | 57.5  | 64    | 24   | 80   | 30   | 22   | F10 | F07 | M10x18      | M8x14       | 1/4"       |
|        | 11.18 | 5.24  | 4.15  | 6.02  | 2.26  | 2.52  | 0.94 | 3.15 | 1.18 | 0.87 |     |     | 3/8"-16UNC  | 5/16"-18UNC |            |
| HT-125 | 340   | 155   | 120.5 | 175   | 67.5  | 70    | 27.5 | 80   | 30   | 22   | F10 | F07 | M10x18      | M8x14       | 1/4"       |
|        | 13.39 | 6.1   | 4.74  | 6.89  | 2.66  | 2.76  | 1.08 | 3.15 | 1.18 | 0.87 |     |     | 3/8"-16UNC  | 5/16"-18UNC |            |
| HT-140 | 414   | 171.5 | 137   | 191.5 | 76    | 77    | 32   | 80   | 30   | 27   | F12 | F10 | M12x22      | M10x18      | 1/4"       |
|        | 16.3  | 6.75  | 5.39  | 7.54  | 2.99  | 3.03  | 1.26 | 3.15 | 1.18 | 1.06 |     |     | 1/2"-13UNC  | 3/8"-16UNC  |            |
| HT-160 | 476   | 197   | 159.5 | 217   | 86.5  | 87.5  | 34   | 80   | 30   | 27   | F12 | F10 | M12x22      | M10x18      | 1/4"       |
|        | 18.74 | 7.76  | 6.28  | 8.54  | 3.41  | 3.44  | 1.34 | 3.15 | 1.18 | 1.06 |     |     | 1/2"-13UNC  | 3/8"-16UNC  |            |
| HT-190 | 524   | 230   | 186   | 260   | 103   | 103   | 40   | 130  | 30   | 36   | F14 | --  | M16x23      | --          | 1/4"       |
|        | 20.63 | 9.06  | 7.32  | 10.24 | 4.06  | 4.06  | 1.57 | 5.12 | 1.18 | 1.42 |     |     | 5/8"-11UNC  | --          |            |
| HT-210 | 559   | 255   | 202   | 285   | 113   | 113   | 40   | 130  | 30   | 36   | F14 | --  | M16x25      | --          | 1/4"       |
|        | 22.01 | 10.04 | 7.95  | 11.22 | 4.45  | 4.45  | 1.57 | 5.12 | 1.18 | 1.42 |     |     | 5/8"-11UNC  | --          |            |
| HT-240 | 668   | 291.4 | 233   | 321.4 | 129   | 129   | 50   | 130  | 30   | 46   | F16 | --  | M20x28      | --          | 1/4"or3/8" |
|        | 26.3  | 11.47 | 9.17  | 12.65 | 5.08  | 5.08  | 1.97 | 5.12 | 1.18 | 1.81 |     |     | 3/4"-10UNC  | --          |            |
| HT-270 | 744   | 320   | 264   | 350   | 146   | 146   | 57   | 130  | 30   | 46   | F16 | --  | M20x28      | --          | 1/4"or1/2" |
|        | 29.29 | 12.6  | 10.39 | 13.78 | 5.75  | 5.75  | 2.24 | 5.12 | 1.18 | 1.81 |     |     | 3/4"-10UNC  | --          |            |
| HT-300 | 830   | 362   | 312.5 | 392   | 194.5 | 194.5 | 57   | 130  | 30   | 46   | F16 | F25 | M20x28      | M16x23      | 1/2"       |
|        | 32.68 | 14.25 | 12.3  | 15.43 | 7.66  | 7.66  | 2.24 | 5.12 | 1.18 | 1.81 |     |     | 3/4"-10UNC  | 5/8"-11UNC  |            |
| HT-350 | 920   | 413   | 353.5 | 443   | 221.5 | 221.5 | 60   | 130  | 30   | 55   | F16 | F25 | M20x28      | M16x23      | 1/2"       |
|        | 36.22 | 16.26 | 13.92 | 17.44 | 8.72  | 8.72  | 2.36 | 5.12 | 1.18 | 2.17 |     |     | 3/4"-10UNC  | 5/8"-11UNC  |            |
| HT-400 | 1012  | 465   | 391   | 495   | 248   | 248   | 60   | 130  | 30   | 55   | F16 | F25 | M20x28      | M16x23      | 1/2"       |
|        | 39.84 | 18.31 | 15.39 | 19.49 | 9.76  | 9.76  | 2.36 | 5.12 | 1.18 | 2.17 |     |     | 3/4"-10UNC  | 5/8"-11UNC  |            |

## Air Consumption - Air Volume Opening & Closing

| Model  | Air Volume@opening<br>(liter/cu.in) | Air Volume@closing<br>(liter/cu.in) | Model  | Air Volume@opening<br>(liter/cu.in) | Air Volume@closing<br>(liter/cu.in) |
|--------|-------------------------------------|-------------------------------------|--------|-------------------------------------|-------------------------------------|
| HT-32  | 0.03<br>1.71                        | 0.04<br>2.32                        | HT-125 | 1.20<br>73.22                       | 1.60<br>97.62                       |
| HT-52  | 0.09<br>5.49                        | 0.12<br>7.32                        | HT-140 | 1.70<br>103.72                      | 2.40<br>146.43                      |
| HT-63  | 0.14<br>8.54                        | 0.20<br>12.20                       | HT-160 | 2.60<br>158.63                      | 3.70<br>225.75                      |
| HT-75  | 0.21<br>12.81                       | 0.30<br>18.30                       | HT-190 | 4.20<br>256.25                      | 5.90<br>359.98                      |
| HT-83  | 0.29<br>17.69                       | 0.41<br>25.02                       | HT-210 | 5.70<br>347.77                      | 8.20<br>500.31                      |
| HT-92  | 0.49<br>29.90                       | 0.71<br>43.32                       | HT-240 | 9.00<br>549.12                      | 12.80<br>780.97                     |
| HT-105 | 0.70<br>42.71                       | 0.99<br>60.40                       | HT-270 | 12.60<br>768.76                     | 17.90<br>1092.13                    |

## The Table of Actuators Weight & Opening Closing Time

| Model                              | HT-032  |     | HT-052   |         | HT-063   |         | HT-075   |         | HT-083   |         | HT-092   |          | HT-105   |          |
|------------------------------------|---------|-----|----------|---------|----------|---------|----------|---------|----------|---------|----------|----------|----------|----------|
|                                    | D       | S   | D        | S       | D        | S       | D        | S       | D        | S       | D        | S        | D        | S        |
| Screw stroke adj. for 1° adj. need | ----    |     | 1/5 turn |         | 1/5 turn |         | 1/5 turn |         | 1/5 turn |         | 1/4 turn |          | 1/4 turn |          |
| Opening time (Sec.)                | 0.03    | --- | 0.2      | 0.25    | 0.25     | 0.3     | 0.3      | 0.35    | 0.4      | 0.5     | 0.5      | 0.6      | 0.7      | 0.8      |
| Closing time (Sec.)                | 0.03    | --- | 0.25     | 0.3     | 0.3      | 0.35    | 0.4      | 0.5     | 0.5      | 0.6     | 0.7      | 0.9      | 0.9      | 1.1      |
| Approximate weight (Kg/Lbs)        | 0.5/1.1 | --- | 1.0/2.2  | 1.0/2.2 | 1.6/3.5  | 1.8/4.0 | 2.6/5.7  | 3.1/6.8 | 3.1/6.8  | 3.6/7.9 | 4.9/10.8 | 5.7/12.5 | 6.5/14.3 | 7.7/16.9 |

| Model                              | HT-125   |         | HT-140    |           | HT-160   |         | HT-190   |         | HT-210   |       | HT-240   |          | HT-270   |           |
|------------------------------------|----------|---------|-----------|-----------|----------|---------|----------|---------|----------|-------|----------|----------|----------|-----------|
|                                    | D        | S       | D         | S         | D        | S       | D        | S       | D        | S     | D        | S        | D        | S         |
| Screw stroke adj. for 1° adj. need | 1/4 turn |         | 1/4 turn  |           | 1/4 turn |         | 1/3 turn |         | 1/3 turn |       | 1/3 turn |          | 1/3 turn |           |
| Opening time (Sec.)                | 0.9      | 1.1     | 1.3       | 1.5       | 1.6      | 1.8     | 2.2      | 2.4     | 2.9      | 3.4   | 3.8      | 4.3      | 4.5      | 5.0       |
| Closing time (Sec.)                | 1.2      | 1.4     | 1.6       | 1.9       | 1.9      | 2.2     | 2.6      | 3.0     | 3.8      | 4.1   | 4.4      | 5.0      | 5.0      | 5.5       |
| Approximate weight (Kg/Lbs)        | 9.9/21.8 | 11/24.2 | 13.8/30.4 | 16.3/35.9 | 19/41.8  | 24/52.8 | 28/61.6  | 34/74.8 | 37/81.4  | 45/99 | 52/114.4 | 64/140.8 | 85/187   | 104/228.8 |

## Order Information

| Type                    | Model | Spring Set               | Seals                     | Options                 |
|-------------------------|-------|--------------------------|---------------------------|-------------------------|
| <b>HTD</b>              | 032   | <b>Blank</b>             | <b>Blank</b>              | <b>120</b>              |
| Double Acting Actuator  | 052   | (Double Acting Actuator) | (standard NBR seals)      | 120°operation           |
|                         | 063   | 05                       |                           | <b>180</b>              |
| <b>HTS</b>              | 075   | 06                       | <b>HT= Viton seals</b>    | 180°operation           |
| Spring Return Actuator  | 083   | 07                       | (for high temperature)    | <b>SS</b>               |
|                         | 092   | 08                       |                           | Stainless Steel Housing |
| <b>HTDN</b>             | 105   | 09                       | <b>LT= Silicone seals</b> |                         |
| Double Acting Actuator  | 125   | 10                       | (for low temperature)     |                         |
| (Nickel Plated Housing) | 140   | 11                       |                           |                         |
|                         | 160   | 12                       |                           |                         |
| <b>HTSN</b>             | 190   |                          |                           |                         |
| Spring Return Actuator  | 210   |                          |                           |                         |
| (Nickel Plated Housing) | 240   |                          |                           |                         |
|                         | 270   |                          |                           |                         |

Note: The part numbers are represented as the following: Type-Model-Spring Set-Seals-Options