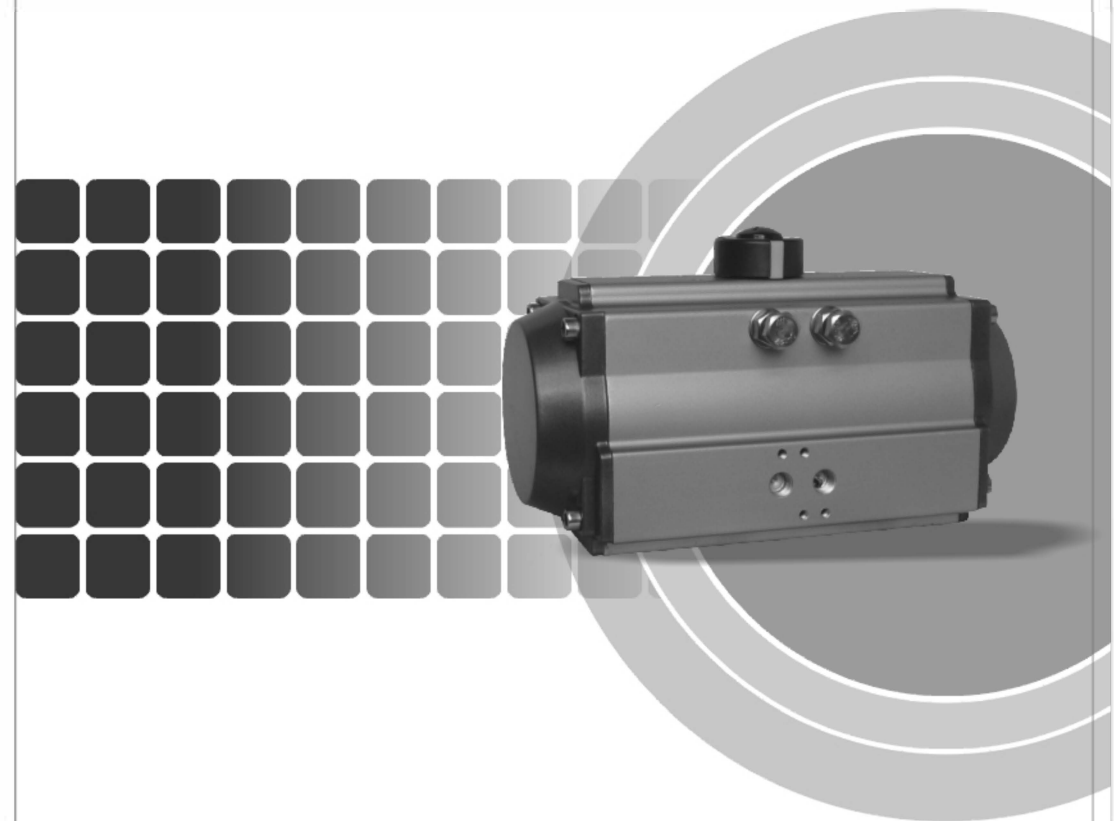


## Pneumatic Actuator

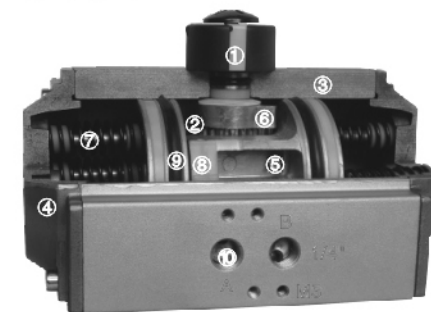
### Use Specification



# CONTENTS

|                                           |     |
|-------------------------------------------|-----|
| Design & Construction                     | 1   |
| Explode View                              | 2   |
| Double Acting Type of Operating Principle | 3   |
| Single Acting Type of Operating Principle | 3   |
| Output Torque of Double Acting Actuator   | 4   |
| Double Acting Actuator Sizing Guide       | 4   |
| Output Torque of Spring Return Actuator   | 5-6 |
| Spring Return Actuator                    | 7   |
| Installation Size                         | 8   |
| Air Consumption                           | 9   |
| Service Conditions to Consider            | 9   |

### ◆ Design & Construction



#### 1. Indicator

Indicator according to VID/VIE3845 is convenient for mounting accessories such as limit switch box, Positioner and etc.

#### 2. Pinion

The design of the nickel-plated alloy steel integrated forging pinion drive is according the NAMUR, ISO5211 and DIN3337 standards.

#### 3. Actuator Body

High quality aluminum alloy extrusion formed. The surface has been treated by anodized hardening followed by epoxy polyester coating. Other surface treatments are available e.g. PTFE and Nickel plating as well as other colourcoatings on request.

#### 4. End Cap

The surface has been treated by anodized hardening followed by epoxy polyester coating. Other surface treatments are available on request e.g. PTFE and Nickel plating as well as other colours on request.

#### 5. Piston

Are manufactured from Die-cast aluminum and treated by anodized hardening process. Symmetric mounting of the piston helps to ensure easy maintenance. Reverse action requirements can be achieved by inverting the pistons.

#### 6. Adjusting Bolt

The two independent adjustment bolts can adjust opening and closing of the mounted valve within  $\pm 5^\circ$

#### 7. Spring

Are manufactured from 65Mn and are epoxy polyester coated. Springs are easily demounted and can be changed by quantity to suit different torque requirement.

#### 8. Piston Ring

Are manufactured from low friction long life material POM. Can be easily changed for maintenance purposes.

#### 9. O-rings

Standard NBR rubber O-rings provide trouble-free operation at standard temperature ranges. For other temperature requirements relevant materials can be offered on request.

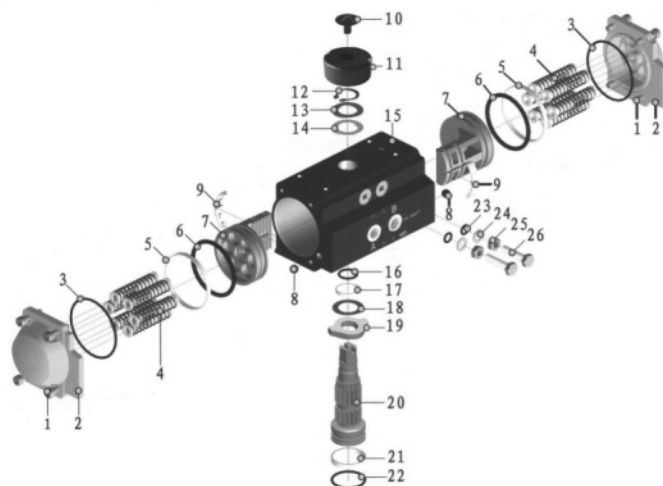
#### 10. Air Connection

Conforms to NAMUR standards

#### 11. All stop parts are manufactured from SS304.

## PNEUMATIC ACTUATOR

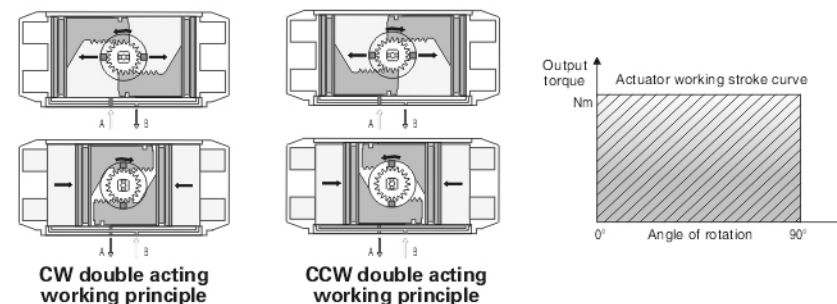
### ◆ Explode View



| No. | Part Description          | Q.TY | Materials           | Surface Treated                   | Optional Material     |
|-----|---------------------------|------|---------------------|-----------------------------------|-----------------------|
| 1   | Socket Head Screw         | 8    | Stainless Steel 304 |                                   |                       |
| 2   | End Cap                   | 2    | AL380               | Anode Hardening+Polyester Coating | CF8/CF8M              |
| 3   | "O" ring (Cylinder Head)  | 2    | NBR Rubber          |                                   | Viton/Silicone Rubber |
| 4   | Spring                    | 6-12 | Spring Steel        | Polyester Coating                 |                       |
| 5   | Piston Ring               | 2    | POM                 |                                   |                       |
| 6   | "O" Ring (Piston)         | 2    | NBR Rubber          |                                   | Viton/Silicone Rubber |
| 7   | Piston                    | 2    | AL380               | Anode Hardening                   |                       |
| 8   | Stopper                   | 2    | NBR Rubber          |                                   | Viton/Silicone Rubber |
| 9   | Guide Ring                | 2    | PA6                 |                                   |                       |
| 10  | Indicator Bolt            | 1    | PA6                 |                                   |                       |
| 11  | Indicator                 | 1    | ABS                 |                                   |                       |
| 12  | Snap Ring                 | 1    | Stainless Steel 304 |                                   |                       |
| 13  | Washer                    | 1    | Stainless Steel 304 |                                   |                       |
| 14  | Outside Washer            | 1    | POM                 |                                   |                       |
| 15  | Body                      | 1    | AL6063-T6           | Anode Hardening+Polyester Coating |                       |
| 16  | "O" Ring (Pinion Top)     | 1    | NBR Rubber          |                                   | Viton/Silicone Rubber |
| 17  | Bearing (Pinion Top)      | 1    | POM                 |                                   |                       |
| 18  | Inside Washer             | 1    | POM                 |                                   |                       |
| 19  | Stroke Adjustment Stop    | 1    | C20                 | Nickel Plated                     |                       |
| 20  | Pinion Shaft              | 1    | C45                 | Nickel Plated                     | SUS304/SUS316         |
| 21  | Bearing (Pinion Bottom)   | 1    | POM                 |                                   |                       |
| 22  | "O" Ring (Pinion Bottom)  | 1    | NBR Rubber          |                                   | Viton/Silicone Rubber |
| 23  | "O" Ring (Adjusting Bolt) | 2    | NBR Rubber          |                                   | Viton/Silicone Rubber |
| 24  | Metal Washer              | 2    | Stainless Steel 304 |                                   |                       |
| 25  | Nut                       | 2    | Stainless Steel 304 |                                   |                       |
| 26  | Adjusting Bolt            | 2    | Stainless Steel 304 |                                   |                       |

## PNEUMATIC ACTUATOR

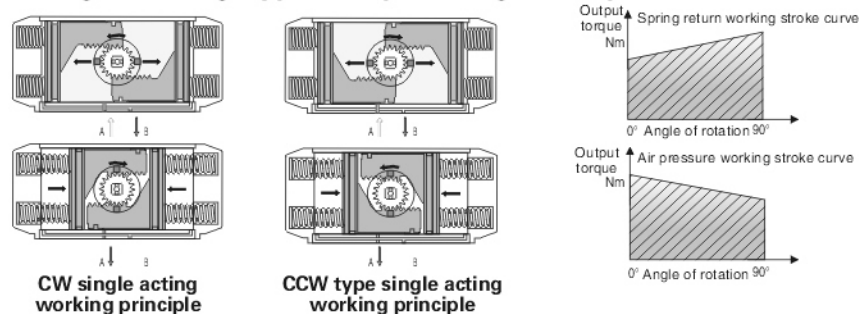
### ◆ Double Acting Type of Operating Principle



When the air source pressure comes into the cylinder body between the two pistons from air entrance (A) and pushes the pistons toward the end of the cylinder body, the air between the pistons and the ends of the cylinder body is released from air entrance (B), meanwhile the pistons drive the output shaft anticlockwise rotate ( $0^\circ - 90^\circ$ ).

The same, when air source pressure comes into the ends of the cylinder body from air entrance (B) and pushes the pistons toward each other with the air between two pistons released from air entrance (A), the output shaft (gear wheel) would be driven by the racks of the pistons simultaneously to rotate clockwise ( $90^\circ - 0^\circ$ ). (If the pistons are assembled in different direction from each other, the output shaft would turn out to rotate inverse direction, namely the double acting reverse "CCW" type).

### ◆ Single Acting Type of Operating Principle



When the air source pressure comes into the cylinder body between the two pistons from air entrance (A) and pushes the pistons toward the end of the cylinder body while the springs at each end inside the cylinder body is forced to shrink with the air between the pistons and the ends of the cylinder body is released from air entrance (B), in the meantime, the racks of pistons drive the output shaft (gear wheel) simultaneously to rotate anticlockwise ( $0^\circ - 90^\circ$ ).

When actuators is in loss of air, The two pistons of cylinder moved to the middle direction by elasticity of the spring, Then the air in the middle space outed from port (A), Make the two pistons rack synchronized driving the two output shaft clockwise rotate ( $90^\circ - 0^\circ$ ). (If the pistons are assembled in different direction from each other, the output shaft would turn out to rotate inverse direction, namely the double acting reverse "CCW" type).

## PNEUMATIC ACTUATOR

### ◆ Output Torque of Double Acting Actuator

| Model  | Air supply pressure (Unit: Bar) |        |        |        |        |        |        |        |        |        |
|--------|---------------------------------|--------|--------|--------|--------|--------|--------|--------|--------|--------|
|        | 2.0bar                          | 2.5bar | 3.0bar | 4.0bar | 4.5bar | 5.0bar | 5.5bar | 6.0bar | 7.0bar | 8.0bar |
| AT-52  | 8                               | 10     | 12     | 16     | 18     | 20     | 22     | 24     | 28     | 32     |
| AT-63  | 15                              | 18     | 22     | 29     | 33     | 37     | 40     | 44     | 51     | 58     |
| AT-75  | 20                              | 25     | 30     | 40     | 45     | 50     | 55     | 60     | 70     | 80     |
| AT-83  | 31                              | 39     | 47     | 63     | 71     | 78     | 86     | 94     | 110    | 125    |
| AT-92  | 45                              | 56     | 68     | 90     | 102    | 113    | 124    | 135    | 158    | 181    |
| AT-105 | 66                              | 83     | 99     | 132    | 149    | 165    | 182    | 198    | 231    | 265    |
| AT-125 | 100                             | 125    | 151    | 201    | 226    | 251    | 276    | 301    | 351    | 401    |
| AT-140 | 171                             | 214    | 257    | 342    | 385    | 428    | 470    | 513    | 599    | 684    |
| AT-160 | 266                             | 333    | 399    | 532    | 599    | 665    | 732    | 798    | 931    | 1064   |
| AT-190 | 426                             | 532    | 638    | 851    | 958    | 1064   | 1170   | 1277   | 1490   | 1702   |
| AT-210 | 532                             | 665    | 798    | 1064   | 1197   | 1330   | 1463   | 1596   | 1862   | 2128   |
| AT-240 | 770                             | 962    | 1154   | 1539   | 1731   | 1924   | 2116   | 2309   | 2693   | 3078   |
| AT-270 | 1170                            | 1462   | 1755   | 2339   | 2632   | 2924   | 3217   | 3509   | 4094   | 4679   |

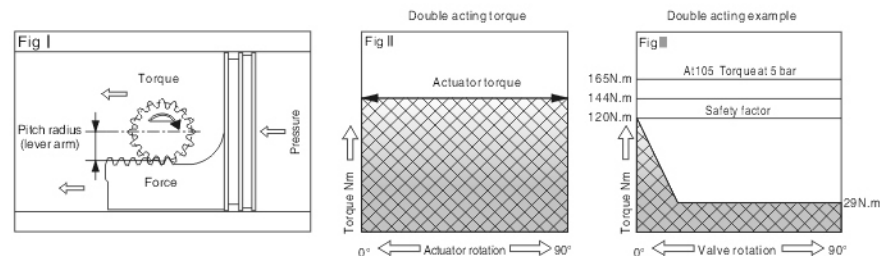
### ◆ Double Acting Actuator Sizing Guide

#### Double Acting Actuation Guide:

The output torque of rack and pinion pneumatic actuator=piston pressure (air supply pressure) × pitch radius (lever of arm), as Fig.01. Besides, the friction resistance and efficiency are very high. As Fig.02, both of the output torque are linear when CCW or CW. The suggested safety factor for double acting actuators under normal working conditions is 15%~20%.

#### Example (check the technical data sheet)

- Butterfly valve's output torque=120N.m
- Safety factor (20%)=120N.m+20%=144N.m
- Air supply pressure=5 bar
- When air supply pressure is 5 Bar, the kind of AT double acting actuator with output 144N.m you need at least is At105 for this operation.



## PNEUMATIC ACTUATOR

### ◆ Output Torque of Spring Return Actuator

| Size<br>Model | Springs<br>Qty | Output Torque (N.M) |         |          |         |          |         |          |         |          |         |          |         |          |         |          |         | Springs' output |  |
|---------------|----------------|---------------------|---------|----------|---------|----------|---------|----------|---------|----------|---------|----------|---------|----------|---------|----------|---------|-----------------|--|
|               |                | 2.5bar              |         | 3.0bar   |         | 4.0bar   |         | 5.0bar   |         | 6.0bar   |         | 7.0bar   |         | 8.0bar   |         |          |         |                 |  |
|               |                | 0° Start            | 90° End | 0° Start | 90° End | 0° Start | 90° End | 0° Start | 90° End | 0° Start | 90° End | 0° Start | 90° End | 0° Start | 90° End | 0° Start | 90° End |                 |  |
| ATK-52        | 05             | 5.7                 | 3.8     | 7.6      | 5.7     |          |         |          |         |          |         |          |         |          |         |          | 6.2     | 4.3             |  |
|               | 06             | 4.9                 | 2.5     | 6.9      | 4.5     | 10.9     | 8.5     |          |         |          |         |          |         |          |         |          | 7.4     | 5.0             |  |
|               | 07             | 4.0                 | 1.3     | 6.0      | 3.3     | 9.8      | 7.3     | 14.0     | 10.4    |          |         |          |         |          |         |          | 8.6     | 5.9             |  |
|               | 08             |                     |         |          | 5.2     | 2.0      | 9.2     | 6.0      | 13.2    | 9.1      | 17.2    | 14.1     |         |          |         |          | 9.9     | 6.7             |  |
|               | 09             |                     |         |          | 4.3     | 0.8      | 8.3     | 4.8      | 12.3    | 7.9      | 16.3    | 12.8     | 20.3    | 16.8     |         |          | 11.1    | 7.6             |  |
|               | 10             |                     |         |          |         |          | 7.4     | 3.6      | 11.5    | 6.7      | 15.5    | 11.6     | 19.5    | 15.6     |         |          | 12.4    | 8.5             |  |
|               | 11             |                     |         |          |         |          | 6.6     | 2.3      | 10.6    | 5.4      | 14.6    | 10.4     | 18.6    | 14.3     | 22.6    | 18.3     | 13.6    | 9.3             |  |
|               | 12             |                     |         |          |         |          |         |          | 9.7     | 4.2      | 13.8    | 9.1      | 17.8    | 12.2     | 21.8    | 17.1     | 14.8    | 10.2            |  |
| ATK-63        | 05             | 11.4                | 7.7     | 15.0     | 11.4    | 22.3     | 14.9    |          |         |          |         |          |         |          |         |          | 10.4    | 6.8             |  |
|               | 06             | 10.1                | 5.7     | 13.6     | 9.3     | 20.9     | 16.6    | 28.3     | 23.9    |          |         |          |         |          |         |          | 12.5    | 8.2             |  |
|               | 07             | 8.6                 | 3.6     | 12.5     | 7.2     | 19.5     | 14.5    | 26.8     | 21.9    |          |         |          |         |          |         |          | 14.6    | 9.6             |  |
|               | 08             |                     |         |          | 10.9    | 5.1      | 18.2    | 12.4     | 25.5    | 19.8     | 32.8    | 27.0     | 40.1    | 34.3     |         |          | 16.7    | 10.9            |  |
|               | 09             |                     |         |          |         |          | 16.8    | 10.4     | 24.1    | 17.7     | 31.4    | 24.9     | 38.7    | 32.2     |         |          | 18.8    | 12.3            |  |
|               | 10             |                     |         |          |         |          | 1.4     | 8.2      | 22.8    | 15.6     | 30.0    | 22.8     | 37.3    | 30.1     | 44.7    | 37.4     | 20.9    | 13.7            |  |
|               | 11             |                     |         |          |         |          |         |          | 21.5    | 13.5     | 28.7    | 20.7     | 36.0    | 28.0     | 43.3    | 35.3     | 22.9    | 15.0            |  |
|               | 12             |                     |         |          |         |          |         |          | 20.0    | 11.4     | 27.3    | 18.6     | 34.6    | 25.9     | 41.9    | 33.3     | 25.0    | 16.4            |  |
| ATK-75        | 05             | 14.5                | 10.6    | 19.4     | 15.5    | 29.5     | 25.7    |          |         |          |         |          |         |          |         |          | 14.5    | 10.5            |  |
|               | 06             | 12.4                | 7.6     | 17.3     | 12.6    | 27.4     | 22.7    | 37.5     | 32.8    |          |         |          |         |          |         |          | 17.4    | 12.7            |  |
|               | 07             | 10.4                | 4.8     | 15.2     | 9.7     | 25.3     | 19.9    | 35.4     | 29.9    |          |         |          |         |          |         |          | 20.3    | 14.8            |  |
|               | 08             |                     |         |          | 13.1    | 6.8      | 23.1    | 16.9     | 33.3    | 27.0     | 43.2    | 37.0     | 53.3    | 47.0     |         |          | 23.2    | 16.9            |  |
|               | 09             |                     |         |          |         |          | 21.0    | 14.1     | 31.2    | 24.1     | 41.1    | 34.1     | 51.2    | 44.2     |         |          | 26.1    | 19.0            |  |
|               | 10             |                     |         |          |         |          | 19.0    | 11.1     | 28.8    | 21.2     | 39.0    | 31.2     | 49.1    | 41.2     | 59.1    | 51.2     | 29.0    | 21.1            |  |
|               | 11             |                     |         |          |         |          |         |          | 27.0    | 18.3     | 37.0    | 28.3     | 47.0    | 38.4     | 57.0    | 48.4     | 31.9    | 23.2            |  |
|               | 12             |                     |         |          |         |          |         |          | 24.9    | 15.4     | 34.9    | 25.4     | 44.9    | 35.4     | 54.9    | 45.4     | 34.7    | 25.3            |  |
| ATK-83        | 05             | 23.3                | 16.1    | 31.1     | 24.0    | 46.8     | 39.7    |          |         |          |         |          |         |          |         |          | 23.0    | 15.8            |  |
|               | 06             | 20.1                | 11.5    | 28.0     | 19.3    | 43.7     | 35.1    | 59.4     | 50.7    |          |         |          |         |          |         |          | 27.6    | 19.0            |  |
|               | 07             | 17.0                | 6.9     |          | 24.8    | 14.8     | 40.5    | 30.5     | 56.2    | 46.2     |         |          |         |          |         |          | 32.2    | 22.1            |  |
|               | 08             |                     |         |          | 21.7    | 10.1     | 37.4    | 25.8     | 53.1    | 41.5     | 68.8    | 57.2     | 84.5    | 72.9     |         |          | 36.8    | 25.3            |  |
|               | 09             |                     |         |          |         |          | 34.2    | 21.3     | 49.9    | 37.0     | 65.6    | 52.6     | 81.2    | 68.3     |         |          | 41.4    | 28.5            |  |
|               | 10             |                     |         |          |         |          | 31.0    | 16.6     | 46.7    | 32.3     | 62.4    | 48.0     | 78.1    | 63.7     | 93.8    | 79.3     | 46.0    | 31.6            |  |
|               | 11             |                     |         |          |         |          |         |          | 43.6    | 27.7     | 59.3    | 43.4     | 75.0    | 59.1     | 90.6    | 74.8     | 50.6    | 34.8            |  |
|               | 12             |                     |         |          |         |          |         |          | 40.4    | 23.2     | 56.1    | 38.9     | 71.7    | 54.5     | 87.4    | 70.2     | 55.2    | 38.0            |  |
| ATK-92        | 05             | 33.1                | 22.0    | 44.2     | 33.2    | 66.8     | 55.9    |          |         |          |         |          |         |          |         |          | 34.4    | 23.3            |  |
|               | 06             | 28.4                | 15.2    | 39.6     | 26.4    | 62.2     | 49.0    | 87.8     | 71.6    |          |         |          |         |          |         |          | 41.2    | 28.0            |  |
|               | 07             | 23.8                | 8.2     | 34.9     | 19.4    | 57.5     | 42.1    | 80.2     | 64.7    |          |         |          |         |          |         |          | 48.1    | 32.7            |  |
|               | 08             |                     |         |          | 31.3    | 12.6     | 52.9    | 35.2     | 75.5    | 57.9     | 98.1    | 80.5     | 120.7   | 103.0    |         |          | 55.0    | 37.3            |  |
|               | 09             |                     |         |          |         |          | 48.2    | 28.4     | 70.9    | 51.0     | 93.5    | 73.6     | 116.0   | 96.1     |         |          | 61.9    | 42.0            |  |
|               | 10             |                     |         |          |         |          | 43.6    | 21.5     | 66.2    | 44.1     | 88.8    | 66.7     | 111.3   | 89.2     | 134.0   | 111.8    | 68.7    | 46.7            |  |
|               | 11             |                     |         |          |         |          |         |          | 61.5    | 37.2     | 84.1    | 59.9     | 106.6   | 82.4     | 129.2   | 105.0    | 75.6    | 51.4            |  |
|               | 12             |                     |         |          |         |          |         |          | 56.8    | 30.4     | 79.4    | 53.0     | 101.9   | 75.5     | 124.5   | 98.1     | 82.5    | 56.0            |  |
| ATK-105       | 05             | 51.0                | 33.4    | 67.5     | 49.9    | 100.6    | 83.0    |          |         |          |         |          |         |          |         |          | 49.2    | 31.6            |  |
|               | 06             | 44.7                | 23.5    | 61.1     | 40.0    | 94.2     | 73.2    | 127.3    | 106.2   |          |         |          |         |          |         |          | 59.1    | 38.0            |  |
|               | 07             | 38.4                | 13.7    | 54.9     | 30.3    | 87.9     | 63.4    | 121.0    | 96.4    |          |         |          |         |          |         |          | 68.9    | 44.3            |  |
|               | 08             |                     |         |          | 48.5    | 20.4     | 81.6    | 53.5     | 114.7   | 86.5     | 147.7   | 119.6    | 180.8   | 152.7    |         |          | 78.7    | 50.6            |  |
|               | 09             |                     |         |          |         |          | 75.3    | 43.7     | 108.4   | 76.8     | 141.5   | 109.8    | 174.5   | 142.9    |         |          | 88.6    | 56.9            |  |
|               | 10             |                     |         |          |         |          | 68.9    | 33.4     | 102.0   | 66.5     | 135.1   | 99.6     | 168.2   | 132.6    | 201.2   | 165.7    | 98.4    | 63.3            |  |
|               | 11             |                     |         |          |         |          |         |          | 95.7    | 57.0     | 128.7   | 90.1     | 161.8   | 123.1    | 194.8   | 156.2    | 108.3   | 69.6            |  |
|               | 12             |                     |         |          |         |          |         |          | 89.4    | 47.5     | 122.5   | 80.6     | 155.5   | 113.6    | 188.6   | 146.7    | 118.1   | 75.9            |  |

## PNEUMATIC ACTUATOR

### ◆ Output Torque of Spring Return Actuator

| Size<br>Model | Springs<br>Qty | Output Torque (N.M) |            |             |            |             |            |             |            |             |            |             |            |             |            |              |            | 彈簧復位扭矩<br>Springs' output |  |
|---------------|----------------|---------------------|------------|-------------|------------|-------------|------------|-------------|------------|-------------|------------|-------------|------------|-------------|------------|--------------|------------|---------------------------|--|
|               |                | 2.5bar              |            | 3.0bar      |            | 4.0bar      |            | 5.0bar      |            | 6.0bar      |            | 7.0bar      |            | 8.0bar      |            | 90°<br>Start | 90°<br>End |                           |  |
|               |                | 0°<br>Start         | 90°<br>End | 0°<br>Start | 90°<br>End | 0°<br>Start | 90°<br>End | 0°<br>Start | 90°<br>End | 0°<br>Start | 90°<br>End | 0°<br>Start | 90°<br>End | 0°<br>Start | 90°<br>End |              |            |                           |  |
| ATK-125       | 05             | 73                  | 47         | 98          | 72         | 148         | 122        |             |            |             |            |             |            |             |            |              | 79         | 52                        |  |
|               | 06             | 63                  | 31         | 88          | 56         | 138         | 107        | 188         | 157        |             |            |             |            |             |            |              | 94         | 63                        |  |
|               | 07             | 52                  | 15         | 77          | 40         | 127         | 90         | 178         | 141        |             |            |             |            |             |            |              | 110        | 73                        |  |
|               | 08             |                     |            |             | 67         | 25          | 117        | 75          | 167        | 125         | 217        | 176         | 268        | 226         |            |              | 125        | 84                        |  |
|               | 09             |                     |            |             |            |             | 107        | 59          | 157        | 109         | 207        | 159         | 257        | 210         |            |              | 141        | 94                        |  |
|               | 10             |                     |            |             |            |             | 96         | 44          | 146        | 94          | 196        | 144         | 247        | 194         | 297        | 245          | 157        | 105                       |  |
|               | 11             |                     |            |             |            |             |            |             | 136        | 78          | 186        | 128         | 236        | 178         | 286        | 228          | 173        | 111                       |  |
|               | 12             |                     |            |             |            |             |            |             | 125        | 63          | 176        | 113         | 226        | 163         | 276        | 213          | 188        | 125                       |  |
| ATK-140       | 05             | 128                 | 85         | 171         | 127        | 256         | 213        |             |            |             |            |             |            |             |            |              | 129        | 86                        |  |
|               | 06             | 111                 | 59         | 154         | 102        | 239         | 187        | 325         | 273        |             |            |             |            |             |            |              | 155        | 103                       |  |
|               | 07             | 94                  | 33         | 137         | 76         | 222         | 162        | 308         | 247        |             |            |             |            |             |            |              | 181        | 120                       |  |
|               | 08             |                     |            | 120         | 50         | 205         | 136        | 291         | 221        | 376         | 307        | 462         | 392        |             |            |              | 206        | 137                       |  |
|               | 09             |                     |            |             |            | 187         | 110        | 273         | 196        | 358         | 281        | 444         | 367        |             |            |              | 232        | 155                       |  |
|               | 10             |                     |            |             |            | 170         | 84         | 256         | 169        | 341         | 255        | 427         | 340        | 512         | 426        | 258          | 172        |                           |  |
|               | 11             |                     |            |             |            |             |            | 238         | 143        | 324         | 229        | 409         | 314        | 495         | 400        | 284          | 189        |                           |  |
|               | 12             |                     |            |             |            |             |            | 221         | 118        | 307         | 203        | 392         | 289        | 478         | 374        | 310          | 206        |                           |  |
| ATK-160       | 05             | 193                 | 124        | 259         | 191        | 392         | 324        |             |            |             |            |             |            |             |            |              | 208        | 140                       |  |
|               | 06             | 165                 | 83         | 232         | 149        | 365         | 282        | 498         | 415        |             |            |             |            |             |            |              | 250        | 168                       |  |
|               | 07             | 137                 | 41         | 203         | 107        | 336         | 240        | 469         | 373        |             |            |             |            |             |            |              | 292        | 196                       |  |
|               | 08             |                     |            | 176         | 66         | 309         | 199        | 442         | 237        | 575         | 465        | 708         | 598        |             |            |              | 333        | 223                       |  |
|               | 09             |                     |            |             |            | 280         | 157        | 413         | 290        | 546         | 423        | 679         | 556        |             |            |              | 375        | 251                       |  |
|               | 10             |                     |            |             |            | 253         | 115        | 386         | 248        | 519         | 381        | 652         | 514        | 785         | 647        | 417          | 279        |                           |  |
|               | 11             |                     |            |             |            |             |            | 258         | 207        | 491         | 340        | 624         | 473        | 757         | 606        | 458          | 307        |                           |  |
|               | 12             |                     |            |             |            |             |            | 330         | 165        | 463         | 298        | 596         | 431        | 729         | 564        | 500          | 335        |                           |  |
| ATK-190       | 05             | 332                 | 222        | 438         | 329        | 651         | 542        |             |            |             |            |             |            |             |            |              | 309        | 200                       |  |
|               | 06             | 292                 | 161        | 398         | 267        | 611         | 480        | 824         | 693        |             |            |             |            |             |            |              | 371        | 240                       |  |
|               | 07             | 252                 | 99         | 358         | 205        | 571         | 418        | 784         | 631        |             |            |             |            |             |            |              | 433        | 280                       |  |
|               | 08             |                     |            | 318         | 143        | 531         | 356        | 744         | 569        | 957         | 782        | 1169        | 995        |             |            |              | 495        | 30                        |  |
|               | 09             |                     |            |             |            | 491         | 295        | 704         | 47         | 917         | 720        | 1130        | 933        |             |            |              | 557        | 360                       |  |
|               | 10             |                     |            |             |            | 451         | 233        | 664         | 446        | 877         | 658        | 1090        | 871        | 1302        | 1084       | 618          | 400        |                           |  |
|               | 11             |                     |            |             |            |             |            | 624         | 384        | 837         | 597        | 1050        | 809        | 1263        | 1022       | 680          | 440        |                           |  |
|               | 12             |                     |            |             |            |             |            | 584         | 322        | 797         | 535        | 1010        | 748        | 1223        | 960        | 742          | 480        |                           |  |
| ATK-210       | 05             | 390                 | 285        | 523         | 418        | 789         | 684        |             |            |             |            |             |            |             |            |              | 380        | 275                       |  |
|               | 06             | 335                 | 209        | 468         | 342        | 734         | 608        | 1000        | 874        |             |            |             |            |             |            |              | 456        | 330                       |  |
|               | 07             | 280                 | 133        | 413         | 266        | 679         | 532        | 945         | 798        |             |            |             |            |             |            |              | 532        | 385                       |  |
|               | 08             |                     |            | 358         | 190        | 624         | 456        | 890         | 722        | 1156        | 988        | 1422        | 1254       |             |            |              | 608        | 440                       |  |
|               | 09             |                     |            |             |            | 569         | 380        | 835         | 646        | 1101        | 912        | 1367        | 1178       |             |            |              | 684        | 495                       |  |
|               | 10             |                     |            |             |            | 514         | 304        | 780         | 570        | 1046        | 836        | 1312        | 1102       | 1578        | 1368       | 760          | 550        |                           |  |
|               | 11             |                     |            |             |            |             |            | 725         | 494        | 991         | 760        | 1257        | 1026       | 1523        | 1292       | 836          | 605        |                           |  |
|               | 12             |                     |            |             |            |             |            | 670         | 418        | 936         | 684        | 1202        | 950        | 1468        | 1216       | 912          | 660        |                           |  |
| ATK-240       | 05             | 552                 | 409        | 744         | 600        | 1129        | 985        |             |            |             |            |             |            |             |            |              | 554        | 410                       |  |
|               | 06             | 470                 | 297        | 662         | 489        | 1047        | 874        | 1432        | 1259       |             |            |             |            |             |            |              | 665        | 492                       |  |
|               | 07             | 388                 | 187        | 580         | 379        | 964         | 764        | 1349        | 1149       |             |            |             |            |             |            |              | 775        | 575                       |  |
|               | 08             |                     |            | 498         | 268        | 883         | 653        | 1267        | 1037       | 1652        | 1422       | 2037        | 1807       |             |            |              | 886        | 656                       |  |
|               | 09             |                     |            |             |            | 800         | 542        | 1185        | 926        | 1569        | 1311       | 1954        | 1696       |             |            |              | 998        | 739                       |  |
|               | 10             |                     |            |             |            | 718         | 431        | 1103        | 816        | 1488        | 1201       | 1872        | 1586       | 2257        | 1970       | 1108         | 821        |                           |  |
|               | 11             |                     |            |             |            |             |            | 1021        | 705        | 1406        | 1090       | 1791        | 1474       | 2176        | 1859       | 1219         | 903        |                           |  |
|               | 12             |                     |            |             |            |             |            | 939         | 594        | 1323        | 979        | 1708        | 1363       | 2093        | 1748       | 1330         | 985        |                           |  |
| ATK-270       | 05             | 903                 | 675        | 1195        | 968        | 1779        | 1552       |             |            |             |            |             |            |             |            |              | 787        | 560                       |  |
|               | 06             | 790                 | 519        | 1083        | 811        | 1667        | 1396       | 2252        | 1981       |             |            |             |            |             |            |              | 947        | 672                       |  |
|               | 07             | 679                 | 361        | 972         | 654        | 1556        | 1238       | 2141        | 1823       |             |            |             |            |             |            |              | 1101       | 783                       |  |
|               | 08             |                     |            | 860         | 497        | 1444        | 1081       | 2029        | 1666       | 2614        | 2252       | 3199        | 2836       |             |            |              | 1258       | 895                       |  |
|               | 09             |                     |            |             |            | 1332        | 923        | 1917        | 1509       | 2502        | 2094       | 3087        | 2678       |             |            |              | 1416       | 1007                      |  |
|               | 10             |                     |            |             |            | 1220        | 767        | 1805        | 1352       | 2390        | 1937       | 2974        | 2521       | 3560        | 3107       | 1572         | 1119       |                           |  |
|               | 11             |                     |            |             |            |             |            | 1693        | 1194       | 2278        | 1779       | 2862        | 2364       | 3448        | 2949       | 1730         | 1231       |                           |  |
|               | 12             |                     |            |             |            |             |            | 1582        | 1037       | 2167        | 1623       | 2751        | 2207       | 3336        | 2792       | 1887         | 1342       |                           |  |

## PNEUMATIC ACTUATOR

### ◆ Spring Return Actuator

#### Sizing: Spring Return Actuators

The suggested safety factor for spring return actuator under normal working conditions is 30~50%.

#### Example:

The torque needed by valve=80N.m

The torque consider safety factor=80 ( 1+30% ) =104N.m

Air supply=5Bar

According to the table of spring return actuators' output,

we find output torque of ATK-140 K7 is:

Air stroke0° =308N.m

Air stroke90° =247N.m

Spring stroke90° =181N.m

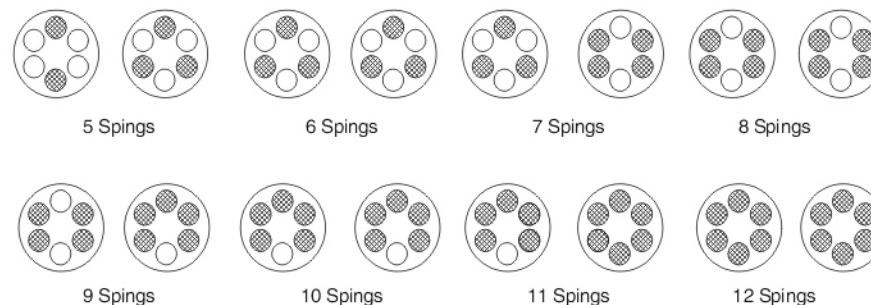
Spring stroke0° =120N.m

All the output torque is larger than we needed.

#### Attention:

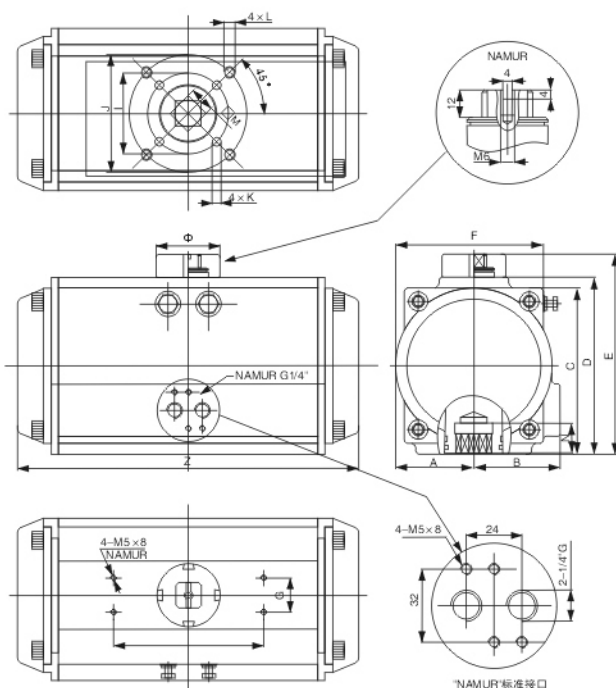
During the restoration, the spring return actuators' output torque will not be affected by the inputting air from the port B. On the contrary, it will help the restoration of springs.

### ◆ Springs Mounting Form for Spring Return Actuators



## PNEUMATIC ACTUATOR

### ◆ Installation Size



### ◆ Dimension Table

| Model  | A    | B    | C      | D     | E     | F     | G  | H   | I    | J    | K      | L      | M  | N  | Z   | Φ   | Air connection |
|--------|------|------|--------|-------|-------|-------|----|-----|------|------|--------|--------|----|----|-----|-----|----------------|
| AT-52  | 30   | 41.5 | 65.5   | 72    | 92    | 65    | 30 | 80  | Φ36  | Φ50  | M5×8   | M6×10  | 11 | 14 | 147 | Φ40 | NAMUR G1/4"    |
| AT-63  | 36   | 47   | 81     | 87.5  | 107.5 | 72    | 30 | 80  | Φ50  | Φ70  | M6×10  | M8×13  | 14 | 18 | 168 | Φ40 | NAMUR G1/4"    |
| AT-75  | 42   | 53   | 94     | 99.5  | 119.5 | 81    | 30 | 80  | Φ50  | Φ70  | M6×10  | M8×13  | 14 | 18 | 184 | Φ40 | NAMUR G1/4"    |
| AT-83  | 46   | 57   | 98.5   | 108.7 | 128.7 | 92    | 30 | 80  | Φ50  | Φ70  | M6×10  | M8×13  | 17 | 21 | 204 | Φ40 | NAMUR G1/4"    |
| AT-92  | 50   | 58.5 | 111    | 116.8 | 136.8 | 98    | 30 | 80  | Φ50  | Φ70  | M6×10  | M8×13  | 17 | 21 | 262 | Φ40 | NAMUR G1/4"    |
| AT-105 | 57.5 | 64   | 122.5  | 133   | 153   | 109.5 | 30 | 80  | Φ70  | Φ102 | M8×13  | M10×16 | 22 | 26 | 268 | Φ40 | NAMUR G1/4"    |
| AT-125 | 67.5 | 74.5 | 145.5  | 155   | 175   | 127.5 | 30 | 80  | Φ70  | Φ102 | M8×13  | M10×16 | 22 | 26 | 296 | Φ55 | NAMUR G1/4"    |
| AT-140 | 75   | 77   | 160.75 | 171.5 | 191.5 | 137.5 | 30 | 80  | Φ102 | Φ125 | M10×16 | M12×20 | 27 | 31 | 390 | Φ55 | NAMUR G1/4"    |
| AT-160 | 87   | 87   | 184    | 197   | 217   | 158   | 30 | 80  | Φ102 | Φ125 | M10×16 | M12×20 | 27 | 31 | 454 | Φ55 | NAMUR G1/4"    |
| AT-190 | 103  | 103  | 216    | 230   | 260   | 189   | 30 | 130 |      | Φ140 |        | M16×25 | 36 | 40 | 525 | Φ80 | NAMUR G1/4"    |
| AT-210 | 113  | 113  | 235.5  | 255   | 285   | 210   | 30 | 130 |      | Φ140 |        | M16×25 | 36 | 40 | 532 | Φ80 | NAMUR G1/4"    |
| AT-240 | 130  | 130  | 264    | 288   | 318   | 245   | 30 | 130 |      | Φ165 |        | M20×25 | 46 | 50 | 610 | Φ80 | NAMUR G1/2"    |
| AT-270 | 147  | 147  | 299    | 326   | 356   | 273   | 30 | 130 |      | Φ165 |        | M20×25 | 46 | 50 | 722 | Φ80 | NAMUR G1/2"    |

## PNEUMATIC ACTUATOR

### ◆ Air Consumption

| Type  | Air volume opening | Air volume closing | Type  | Air volume opening | Air volume closing |
|-------|--------------------|--------------------|-------|--------------------|--------------------|
| AT52  | 0.12               | 0.16               | AT140 | 2.5                | 2.2                |
| AT63  | 0.21               | 0.23               | AT160 | 3.7                | 3.2                |
| AT75  | 0.3                | 0.34               | AT190 | 5.9                | 5.4                |
| AT83  | 0.43               | 0.47               | AT210 | 7.5                | 7.5                |
| AT92  | 0.64               | 0.7                | AT240 | 11                 | 9                  |
| AT105 | 0.95               | 0.88               | AT270 | 17                 | 14                 |
| AT125 | 1.6                | 1.4                |       |                    |                    |

Air consumption rest with Air Supply. Air volume and Action cycle times, expressions:

$$L/\text{Min} = \text{Air volume (Air volume Opening + Air volume closing)} \times \left[ \frac{\text{Air Supply (KPa)} + 101.3}{101.3} \right]$$

Action cycle time (/min)

### ◆ Service Conditions to Consider

#### 1. Operating media:

Dry or lubricated air, or inert gas, or non-corrosive gases that compatible with actuator inner parts and lubricant are available.

The media temperature must 10℃ lower than ambient temperature at least, and the maximum particle diameter must less than 20 μ.

#### 2. Air supply pressure:

3 Bar (40 PSI) ~8 Bar (120 PSI)

#### 3. Operating temperature:

a. Standard: -20℃~+80℃

b. Low temperature: -40℃~+80℃

c. High temperature: -15℃~+150℃

#### 4. Travel adjustment:

Have adjustment range of ± 5 for the rotating 90°

#### 5. Lubricant:

Use the lubricant that temperature range at -20℃ to +80℃. Select special lubricant when the operating condition is low temperature or high temperature.