

World Top Valve Automation Company

Air Motor Multi-turn Valve Actuators

# KA SERIES



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## Air Motor Multi-turn Actuator

Air motor operated valve actuator (AOV) is an actuator for automatic open/close of valves and dampers installed in the site by adjusting torque with the media of decelerator device such as gear using air motor which is rotated by gas pressure such as air or nitrogen.



### Special Features

- > Automation of manual valve is available just with existing air supply in the plant.
- > Compared with electric type, it is more economical because the burden of the construction cost is remarkably low.
- > Applicable for both new or existing manual valves.
- > Applicable regardless of valve type (Multi-Turn, Quarter-Turn).
- > Easy for automation in severe environments such as high temperature, high pressure and/or explosion proof area.



## Product Features

### Appearance

- > Front located controls and indicator bring better accessibility and easy operation no matter its installation direction.
- > Per cent(%) Continuous Type indicator enables continuous valve positioning check and it has high visual stability.

### Safety

- > No risk of explosion by spark as it uses air.
- > Self-locking design performs solid rock reliability on its open/close position even the valve's load change. High stability at the area of much fluctuation of vibration and/or pressure.
- > Redundantly designed safety devices(Open, Close Torque Limit & Geared Limit) perform higher reliability in case of valve over-fastening or valve component problem while the valve is open or close.
- > Excellent in wear resistance and durability due to the internal main power transmission gear operates in oil bath condition.
- > It has more stable characteristics compared to electrical type because there is no interferences. None of electrical signal processing inside, free from outer electrical noise or vibration.

### Convenience

- > May use manual handwheel for valve's open, close by selecting manual mode by lever.
- > Easy maintenance and repair by modular type components by each unit.
- > The use of stainless steel is obligated to prevent internal component corrosion by humidity.
- > Adopted ball bearing at the top and bottom of operating axis, enables easy open and close operation by handwheel with less power.

### Control Type

#### » A Type

- > It is the most general valve automation method that enables the valve's open, close operation by using Open/Stop/Close select switch at the AOV body.



[ A Type ]

#### » B Type

- > Enables the valve operation in remote distance via control switch box. If necessary, it can visualize the valve's open, close status by receiving feedback signal.(Max. distance 30~40m)

B1 : Valve control via switch box, but no feedback.

B2 : Valve control via remote switch box or AOV body. Valve state visualization by receiving air feedback.

- > B type is recommended for the valves in high place where an operator is hard to reach, or stack, top valve of storage tank, underground piping valve and a valve is hardly accessible in case of fire.



[ B2 Type ]

## » C Type

> It is automation type that enables valve control in Local or control room remote control.

- Signal Output : Position transmitter(Limit switch integrated) outputs electrical signal (Dry contact) for full close or open.
- Solenoid valve is attached to the AOV body or control panel for its operation. It has 2 different type upon control method.

C1 : Position Transmitter(PT-01) is attached to AOV body that outputs dry contact, and it will be controlled by remote control panel(solenoid valve attached) in a distance to AOV body.

C2 : AOV Solenoid valve, Position transmitter(PT-01) are attached to AOV body for dry contact output and open, close operation. Once it turned to remote, remote control is available.



[ C1 Type ]

### » D Type

» Basically it is similar to C type. But it uses position transmitter(attached Limit switch, R/I converter potentiometer) which is available for 4~20mA and dry contact output.

D1 : Control valve by the Solenoid valve attached control panel, and display the valve state at the control panel.

D2 : Solenoid valve and position transmitter(PT-01) are attached to AOV body, and it features 4~20mA positioning signal and dry contact output, and the valve on, off control by AOV body. Once it switched to remote control is available.



[ D2 Type ]

### » Function Table

| Function \ Type                  | A | B1 | B2 | C1 | C2 | D1 | D2 |
|----------------------------------|---|----|----|----|----|----|----|
| Selector Switch(Open/Stop/Close) | o | o  | o  | o  | o  | o  | o  |
| Selector Switch(Local/Remote)    | x | o  | o  | o  | o  | o  | o  |
| Air Lamp                         | x | x  | o  | x  | x  | x  | x  |
| Solenoid Valve(Open/Close)       | x | x  | x  | o  | o  | o  | o  |
| Electric Limit Switch            | x | x  | x  | o  | o  | o  | o  |
| Transmitter(4~20mA               | x | x  | x  | o  | o  | o  | o  |

## Applicable Valves

- > Gate Valve (Solid Wedge, Slide Flexible Wedge)
- > Globe Valve (Rising & Nonrising)



- > Ball Valve / Plug Valve
- > Butterfly Valve & Damper



- > Polymer Valve
- > All type of valves which has manual hand wheel.

## Structure

### »» Main Components

#### 1. Switch Unit

- › Components integration ensures reduction of failure and increase of maintenance convenience.
- › Consists of Logic Valve, Limit Switch, Torque Switch

#### 2. Indicator

- › Per cent(%) Continuous Type indicator enables continuous valve positioning check and it has high visual stability through rotation type indicator.
- › Double seal design prevents dew condensation at the Window.

#### 3. Air Motor

- › Adopted Vane type Air Motor secures Torque and RPM for smooth operation.

#### 4. Driving Line

- › Excellent in wear resistance and durability due to the internal main power transmission gear operates in OIL BATH condition.
- › Internal power and signal transmission shafts are secured by Oil Seal structure for a good sealing performance.
- › Top and bottom part of operating shafts are secured by Quad-ring against leakage.

#### 5. Manual Handwheel

- › Wheel rotates during automatic operation. It directly connect to Drive shaft and its hammer blow device enables easier valve operation.

#### 6. Declutch Selector Lever

- › Manual Declutch Type needs to convert its position by select lever. Converting Manual · Auto mode will be made by the lever and clutch. In Manual mode, it enables hand wheel operation, and Auto mode, it enables valve open, close operating by select switch.
- Option : Key lock Function

#### 7. Selector Switch

- › Using of metallic material secures safety against external damages. Oil seals used for operation shaft prevents penetration of moisture.

#### 8. Sealing and Cover Design

- › The sealing function is remarkably increased by using o-rings for Cover assembly parts and its bolting type is designed to meet explosion proof standard to secure safety for the components fixation. Quad rings adopted for the top and bottom of operating axis are prevent leakage.

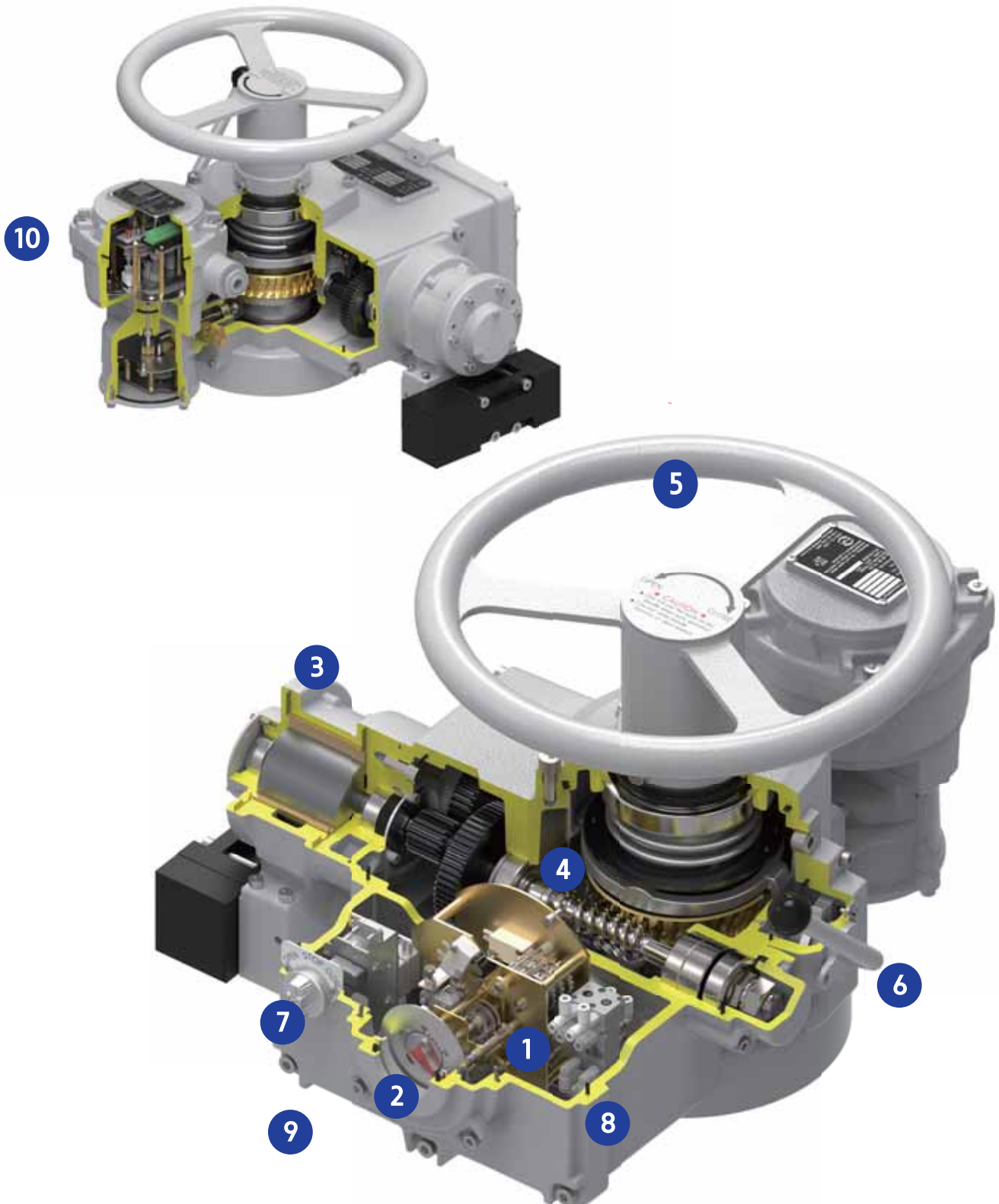
#### 9. Standardized the Signal Air Supply Connection is NPT1/4"

#### 10. Position Transmitter

- › Perfect operation of open, close, Dry Contact or 4~20mA.  
(Certified SGS Baseefa"Exd IIC T6 Gb")

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### Double Motor AOV Main Components

- ① Switch Unit
- ② Indicator
- ③ Air Motor
  - Vane - type air motors with the safety of torque and RPM are arranged in parallel to ensure high-speed, high-torque power transmission characteristics.
- ④ Driving Line
- ⑤ Manual Hand Wheel
  - The wheel is irrotational during automatic operation.
  - It directly connects to Drive Shaft and its hammer blow device enables easier valve operation.
- ⑥ Declutch Lever
  - When manually changing to Auto Declutch type, the valve can be operated with the manual hand wheel.
  - When the motor is operating, it is automatically switched to the auto state and the valve can be opened and closed by the motor power.
- ⑦ Selector Switch
- ⑧ Position Transmitter



## Specifications

### »» Speed-Torque Table

| MODEL                  | Ratio    | A                                 | B      | C      | Weight<br>[kg] |
|------------------------|----------|-----------------------------------|--------|--------|----------------|
|                        | RPM      | 26RPM                             | 40RPM  | 65RPM  |                |
|                        | Capacity | Max Torque(Setting Torque)[kgf-m] |        |        |                |
| 4AM                    | 1Hp      | 30(20)                            | 20(14) | 10(8)  | 36             |
| 6AM                    | 4Hp      | 60(40)                            | 40(30) | 25(20) | 40             |
| 12AM<br>(Double Motor) | 8Hp      | -                                 | 60(40) | 40(30) | 50             |

### »» Mechanical Table

| MODEL                  | INSTALL TYPE |                    |            |                   |              |              |         |
|------------------------|--------------|--------------------|------------|-------------------|--------------|--------------|---------|
|                        | BRACKET      | THRUST TYPE        |            |                   |              |              |         |
|                        |              | key <sup>*1)</sup> | Max Thrust |                   | Max Stem Dia |              | ISO No. |
|                        |              |                    | ton        | Kn                | key          | Threaded     |         |
| 4AM                    | 100L         | 9                  | 88         | 50 <sup>*3)</sup> | 40           | F14<br>(F16) |         |
| 6AM                    | 150L         |                    |            |                   |              |              |         |
|                        | 200L         |                    |            |                   |              |              |         |
| 12AM<br>(Double Motor) | N/A          | 13                 | 127.4      | 50 <sup>*3)</sup> | 50           |              |         |

1) Bracket Type : Following Valve Yoke Sleeve's standard.

2) None Thrust Unit : Direct Mounting Type

## » SPECIFICATION

|                                                                        |                                                                                                 |      |                                |               |
|------------------------------------------------------------------------|-------------------------------------------------------------------------------------------------|------|--------------------------------|---------------|
| Design Specification                                                   | KA Series Actuator is perfect air operate actuator for applications that use multi-turn valves. |      |                                |               |
| Motor                                                                  | Air Supply Pressure : 4,0 to 7,0[kg/cm <sup>2</sup> ]                                           |      |                                |               |
|                                                                        | Size                                                                                            | RPM  | Air Consumption <sup>*1)</sup> | Min Pipe Size |
|                                                                        | 4AM                                                                                             | 2800 | 850                            | 15A           |
|                                                                        | 6AM                                                                                             | 2800 | 1100                           | 15A           |
|                                                                        | 12AM                                                                                            | 2800 | 2200                           | 20A           |
| 1) Air Consumption(Based, $\Delta p=4,0$ kgf/cm <sup>2</sup> )[Nl/min] |                                                                                                 |      |                                |               |
| Noise Level                                                            | Not over than 85db within 1m                                                                    |      |                                |               |
| Hand Wheel, Select Lever                                               | Rotation type hand wheel, Fixed type lever                                                      |      |                                |               |
| Operating Temperature                                                  | Operational ambient temperature is - 20~70℃(-22 to +158°F)                                      |      |                                |               |
| IP GRADE                                                               | IP66                                                                                            |      |                                |               |
| Position Limit Switch                                                  | Gear Drive, Cam Operated, Snap Action Type<br>Max Drive Sleeve Turns : 5000 turns               |      |                                |               |
| Torque Limit Switch                                                    | Open, Close : Slip Action Type                                                                  |      |                                |               |
| Indicator                                                              | Type : Mechanical of Continuous Pointer(0~100%)                                                 |      |                                |               |
| Lubrication                                                            | Grease Moly(EP0 type)                                                                           |      |                                |               |
| Materials                                                              | Aluminium Alloy, Nodular Graphite Casting, Steel or Bronze                                      |      |                                |               |
| Surface Treatment                                                      | Anodizing : 10 micron min                                                                       |      |                                |               |
| External Coating                                                       | Power Coating : 60 micron min / Colour: Munsell No. 4,9B 6,7 / 0,2                              |      |                                |               |

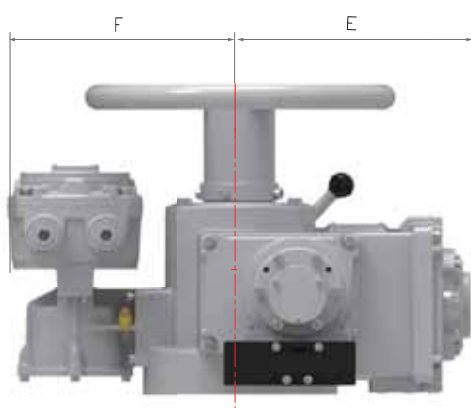
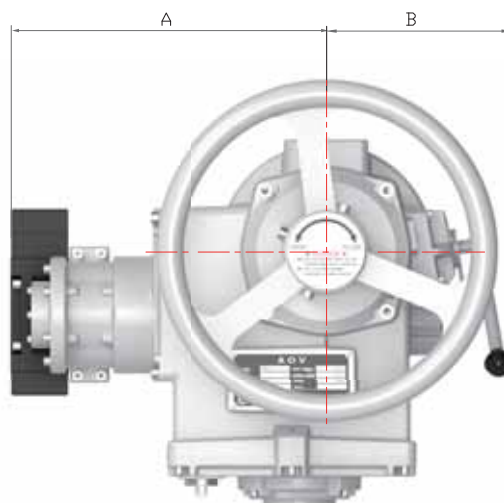
## » OPTIONS

|                                   |                                                                                                                                                                                                                                       |
|-----------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Manual Hand Wheel                 | Manual Declutch Type(None Rotation)<br>Auto Declutch Type (Auto Return)                                                                                                                                                               |
| Key Lock                          | Manual and Automatic Locking                                                                                                                                                                                                          |
| Position Transmitter<br>(PT - 01) | International Hazardous Area - IECEx_BAS_17,0090X_<br>Ex db IIC T6 / Ta -30 to +70℃(-22 to +158°F)<br>Limit Switch : Open & Close 1C Contact<br>Transmitter - 4Wire Type<br>Input : AC100V~250V, Output 4~20mA, Precision $\pm 0,5\%$ |
| FireProofing                      | FR Coating(FR SHELL) Type                                                                                                                                                                                                             |
| Paint                             | Non-standard                                                                                                                                                                                                                          |

※ Please contact us for specifications other than above.

## Size

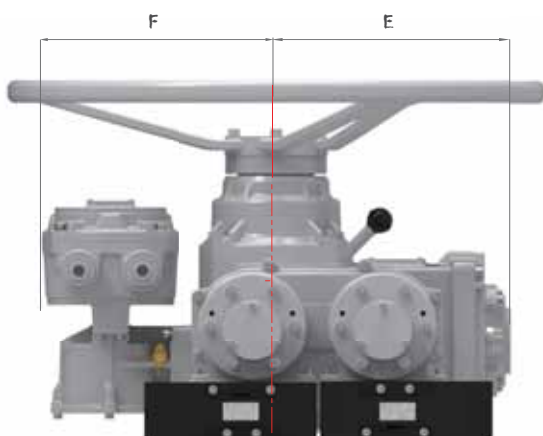
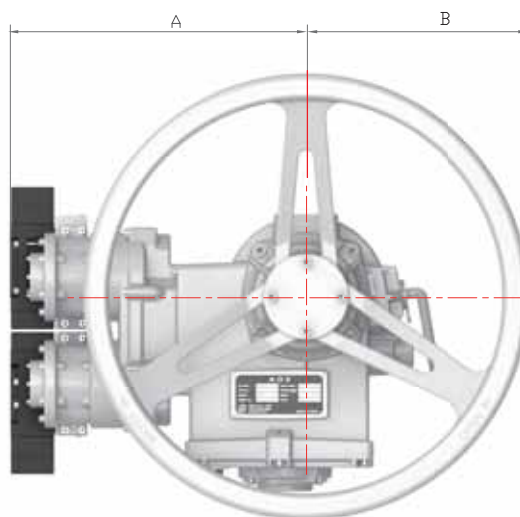
### » Standard Model (4AM, 6AM)



| Capacity \ Size | A   | B   | C   | D   | E   | F   |
|-----------------|-----|-----|-----|-----|-----|-----|
| 4AM             | 299 | 191 | 350 | 350 | 262 | 262 |
| 6AM             | 322 | 191 | 350 | 350 | 262 | 262 |

- ※ F dimensions are for C Type, D Type only.
- ※ Size is subject to change according to specifications and options, please refer to detail size in the approval documents.

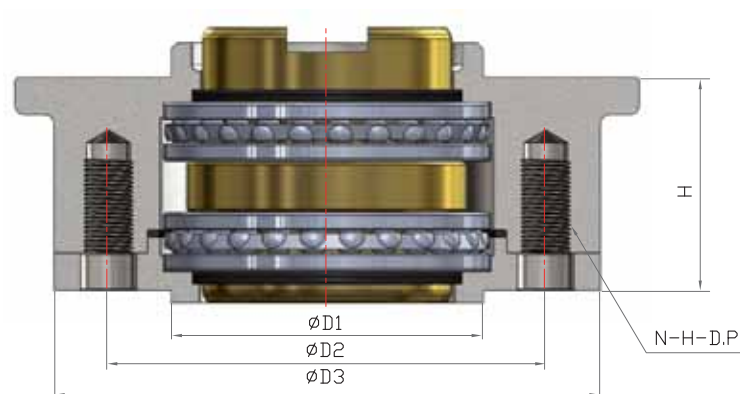
» Double Motor (12AM)



| Type \ Size | Size |     |     |     |     |     |
|-------------|------|-----|-----|-----|-----|-----|
|             | A    | B   | C   | D   | E   | F   |
| 12AM        | 399  | 300 | 391 | 600 | 262 | 262 |

※ Size is subject to change according to specifications and options, please refer to detail size in the approval documents.

## » Thrust Unit(ISO-5210/5211)

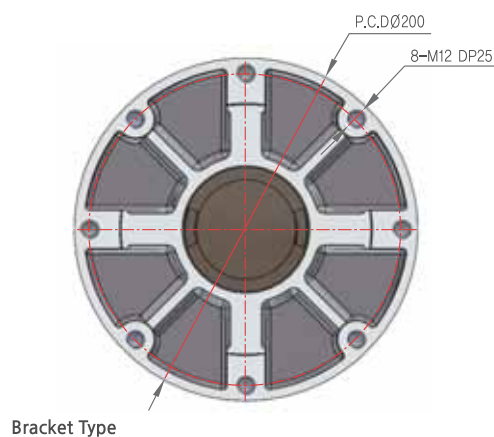


[Unit : mm]

| MODEL | ISO | D1  | D2  | D3  | N-H-DP   | H  | Weight [kg] | Remark |
|-------|-----|-----|-----|-----|----------|----|-------------|--------|
| 4AM   | F14 | 100 | 140 | 175 | 4-M16-35 | 64 | 10          |        |
| 6AM   | F16 | 130 | 165 | 210 | 4-M20-40 | 64 | 11.5        |        |
| 12AM  |     |     |     |     |          |    |             |        |

※12AM is applicable only with F16.

## » Standard Bracket Type - Direct Mounting



## Screw Operated Valve Torque Calculation

Thrust  $F = A \times P \times C + E$  .....(kgf)  
 Torque  $T = K \cdot F$  ..... (kgf-m)  
 A : Cross sectional area of valve port(cm<sup>2</sup>)  
 $= (\pi \times D^2) / 4$  (D=Valve Port Diameter)  
 P : Maximum differential (kg/cm<sup>2</sup>) ..... Generally  
 Maximum at fully closed valve position

When the differential is less than 10kg/cm<sup>2</sup> Take 10kg/cm<sup>2</sup>  
 C : Valve Factor  
 E : Gland Friction Allowance .....(kgf)  
 K : Stem Factor

Table 1. Valve Factor(C)

| Valve          | Valve Factor(C) |            |            |            |
|----------------|-----------------|------------|------------|------------|
|                | Liquid          |            | Gas        |            |
|                | Below 400℃      | Above 400℃ | Below 400℃ | Above 400℃ |
| Parallel Slide | 0.25            | 0.3        | 0.35       | 0.45       |
| Wedge Gate     | 0.35            | 0.4        | 0.45       | 0.5        |
| Lobe           | 1.2             | 1.2        | 1.2        | 1.2        |

Table 2. Gland Allowances(E)

| Stem Dia      | Gland Allowances(E) |
|---------------|---------------------|
| Below 25mmØ   | 400kg               |
| 25-50mmØ      | 700kg               |
| 51mmØ & Above | 1100kg              |

Table 3. Stem Factor(K)

| Stem Dia | Dialead of Screw[mm] |       |       |       |       |       |       |       |       |       |       |
|----------|----------------------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|
|          | 3                    | 5     | 6     | 7     | 8.5   | 10    | 12.5  | 17    | 25    | 44    | 51    |
| 19       | .0020                | .0023 | .0023 | .0026 | .0026 | .0030 |       |       |       |       |       |
| 25       | .0023                | .0026 | .0030 | .0030 | .0033 | .0033 | .0039 |       |       |       |       |
| 32       |                      | .0033 | .0033 | .0036 | .0036 | .0039 | .0043 |       |       |       |       |
| 38       |                      | .0036 | .0039 | .0039 | .0043 | .0043 | .0046 | .0053 | .0066 |       |       |
| 44       |                      |       | .0043 | .0046 | .0046 | .0049 | .0053 | .0062 | .0075 |       |       |
| 51       |                      |       | .0049 | .0046 | .0053 | .0053 | .0056 | .0066 | .0079 |       |       |
| 57       |                      |       | .0053 | .0056 | .0056 | .0059 | .0062 | .0072 | .0085 |       |       |
| 64       |                      |       | .0059 | .0059 | .0062 | .0062 | .0066 | .0075 | .0089 |       |       |
| 70       |                      |       | .0062 | .0066 | .0066 | .0069 | .0072 | .0082 | .0095 |       |       |
| 76       |                      |       | .0069 | .0069 | .0072 | .0072 | .0075 | .0085 | .0098 |       |       |
| 83       |                      |       | .0072 | .0075 | .0075 | .0079 | .0082 | .0092 | .0105 |       |       |
| 89       |                      |       |       |       |       | .0082 | .0085 | .0098 | .0105 | .0131 |       |
| 94       |                      |       |       |       |       | .0089 | .0092 | .0102 | .0115 | .0138 | .0158 |
| 102      |                      |       |       |       |       | .0092 | .0095 | .0105 | .0118 | .0141 | .0164 |
| 108      |                      |       |       |       |       | .0098 | .0102 | .0112 | .0125 | .0148 | .0167 |
| 114      |                      |       |       |       |       | .0102 | .0105 | .0115 | .0128 | .0151 | .0174 |
| 121      |                      |       |       |       |       | .0108 | .0112 | .0121 | .0135 | .0158 | .0177 |
| 127      |                      |       |       |       |       | .0112 | .0115 | .0125 | .0138 | .0161 | .0184 |
| 133      |                      |       |       |       |       | .0118 | .0121 | .0131 | .0144 | .0167 | .0187 |
| 140      |                      |       |       |       |       | .0121 | .0125 | .0135 | .0148 | .0171 | .0194 |
| 147      |                      |       |       |       |       | .0131 | .0135 | .0144 | .0158 | .0181 | .0203 |
| 160      |                      |       |       |       |       |       |       | .0154 | .0167 | .0190 | .0213 |

- Note : - The above formula is a guidance only in sizing the actuators.
- The factors given above shall be a bit different from those of each valve manufacturer.  
Please refer use details to valve manufacturer.
- $K = D_m (\cos \phi \tan \alpha + \mu) / (\cos \phi - \tan \alpha + \mu)$  where  $D_m$ =Mean Stem Diameter  $\approx D-2p$   
 $\phi = 15^\circ$   $\alpha = \tan^{-1} L / \pi D$   $\mu = 0.2$

## Valve Data

### » Gate Valve Torque Table

| Size(inch)<br>Flange Rating | ANSI 150#<br>( $\Delta P=10$ ) | ANSI 300#<br>( $\Delta P=20$ ) | ANSI 600<br>( $\Delta P=42$ ) | ANSI 900#<br>( $\Delta P=63$ ) | ANSI 1500#<br>( $\Delta P=105$ ) | ANSI 2500#<br>( $\Delta P=176$ ) |
|-----------------------------|--------------------------------|--------------------------------|-------------------------------|--------------------------------|----------------------------------|----------------------------------|
| 2                           | 1.3                            | 1.4                            | 1.8                           | 3.2                            | 4.9                              | 6.3                              |
| 2 1/2                       | 1.3                            | 1.6                            | 2.7                           | 4.6                            | 6.8                              | 9.8                              |
| 3                           | 1.8                            | 2.3                            | 3.9                           | 5.3                            | 8.7                              | 11.5                             |
| 4                           | 2.7                            | 3.6                            | 6.3                           | 8.6                            | 15.3                             | 18.3                             |
| 5                           | 3.3                            | 4.6                            | -                             | -                              | 23.4                             | -                                |
| 6                           | 4.3                            | 6.7                            | 15.7                          | 21.2                           | 33.7                             | 44.5                             |
| 8                           | 6.0                            | 12.1                           | 22.7                          | 35.3                           | 53.0                             | 94.2                             |
| 10                          | 10.1                           | 18.3                           | 37.3                          | 56.3                           | 94.3                             | 160.1                            |
| 12                          | 14.2                           | 26.0                           | 53.1                          | 79.1                           | 134.1                            | 218.9                            |
| 14                          | 16.8                           | 32.4                           | 63.7                          | 102.1                          | 188.1                            | 263.5                            |
| 16                          | 22.9                           | 42.1                           | 96.1                          | 112.3                          | 267.6                            | 382.1                            |
| 18                          | 28.5                           | 54.5                           | 117.9                         | 196.1                          | 283.9                            | 584.0                            |
| 20                          | 36.4                           | 69.6                           | 153.2                         | 254.7                          | 473.5                            | 890.5                            |
| 24                          | 54.5                           | 117.0                          | 234.9                         | 419.3                          | 675.9                            | 1762.7                           |
| 26                          | 70.9                           | 144.9                          |                               |                                |                                  |                                  |
| 28                          | 82.0                           | 182.1                          |                               |                                |                                  |                                  |
| 30                          | 94.2                           | 225.0                          |                               |                                |                                  |                                  |
| 32                          | 104.2                          | 244.3                          |                               |                                |                                  |                                  |
| 36                          | 134.3                          | 282.3                          |                               |                                |                                  |                                  |
| 40                          | 160.1                          | 301.3                          |                               |                                |                                  |                                  |
| 42                          | 209.1                          | 383.8                          |                               |                                |                                  |                                  |
| 48                          | 249.4                          | 603.8                          |                               |                                |                                  |                                  |
| 52                          | 304.4                          | 745.0                          |                               |                                |                                  |                                  |

### » Globe Valve Torque Table

| Size(inch)<br>Flange Rating | ANSI 150#<br>( $\Delta P=10$ ) | ANSI 300#<br>( $\Delta P=20$ ) | ANSI 600<br>( $\Delta P=42$ ) | ANSI 900#<br>( $\Delta P=63$ ) | ANSI 1500#<br>( $\Delta P=105$ ) | ANSI 2500#<br>( $\Delta P=176$ ) |
|-----------------------------|--------------------------------|--------------------------------|-------------------------------|--------------------------------|----------------------------------|----------------------------------|
| 2                           | 1.7                            | 2.3                            | 4.6                           | 8.3                            | 12.3                             | 24.8                             |
| 2 1/2                       | 2.0                            | 3.6                            | 7.1                           | 11.5                           | 17.6                             | 30                               |
| 3                           | 2.8                            | 5.3                            | 10.8                          | 16.1                           | 29.9                             | 40                               |
| 4                           | 4.8                            | 9.6                            | 17.7                          | 29.1                           | 46.0                             | 81.6                             |
| 5                           | 6.6                            | 18.2                           | 33.3                          | 47.2                           | -                                | -                                |
| 6                           | 15.0                           | 27.7                           | 46.9                          | 71.4                           | 130.7                            | 182.6                            |
| 8                           | 20.3                           | 49.0                           | 87.1                          | 129.9                          | 147.6                            | 430.0                            |
| 10                          | 33.7                           | 77.2                           | 169.3                         | 239.9                          | 297.6                            | 773.3                            |
| 12                          | 40.2                           | 101.2                          | 289.4                         | 509.4                          | 573.0                            | 1224.2                           |
| 14                          | 69.1                           | 137.5                          |                               |                                |                                  |                                  |
| 16                          | 92.8                           | 191.5                          |                               |                                |                                  |                                  |

It is applied to new valves as reference material of valve companies. It may be different to existing valves' torque value.

$\Delta P$  Unit : kgf/cm<sup>2</sup>

Torque Unit : kgf · m

Torque value of stem itself(Torque value before attaching gear box)

Unspecified as normal valve conforms ANSI standard

Temperature : ANSI 150, 300, 600, 900 : 400℃ Max

## »» Ball Valve Torque Table

| Size(inch) \ Flange Rating | ANSI 150#<br>( $\Delta P=10$ ) | ANSI 300#<br>( $\Delta P=20$ ) | ANSI 600<br>( $\Delta P=42$ ) | ANSI 900#<br>( $\Delta P=63$ ) |
|----------------------------|--------------------------------|--------------------------------|-------------------------------|--------------------------------|
| 2                          | 3.3                            | 5.8                            | 14.5                          | 23.2                           |
| 3                          | 10.2                           | 14.9                           | 28.3                          | 46.8                           |
| 4                          | 19.6                           | 25.0                           | 49.7                          | 84.1                           |
| 6                          | 49.7                           | 78.3                           | 94.3                          | 152.2                          |
| 8                          | 94.2                           | 156.3                          | 166.7                         | 272.5                          |
| 10                         | 126.9                          | 169.6                          | 284.1                         | 463.8                          |
| 12                         | 156.6                          | 239.2                          | 463.8                         | 753.8                          |
| 14                         | 218.9                          | 351.5                          | 672.5                         | 1043.5                         |
| 16                         | 313.1                          | 489.9                          | 898.6                         | 1460.9                         |
| 18                         | 407.3                          | 649.3                          | 1147.9                        | 1981.9                         |
| 20                         | 521.8                          | 834.8                          | 1460.9                        | 2608.7                         |

Based on 2 seat general trunnion ball valve

$\Delta P$  Unit :  $\text{kgf/cm}^2$ , Torque Unit :  $\text{kgf/cm}^2$

Torque value of stem itself (torque value before attaching gear box)

Referred Korean Valve manufacturers' data, and it may be different to each company. Based on new valves.

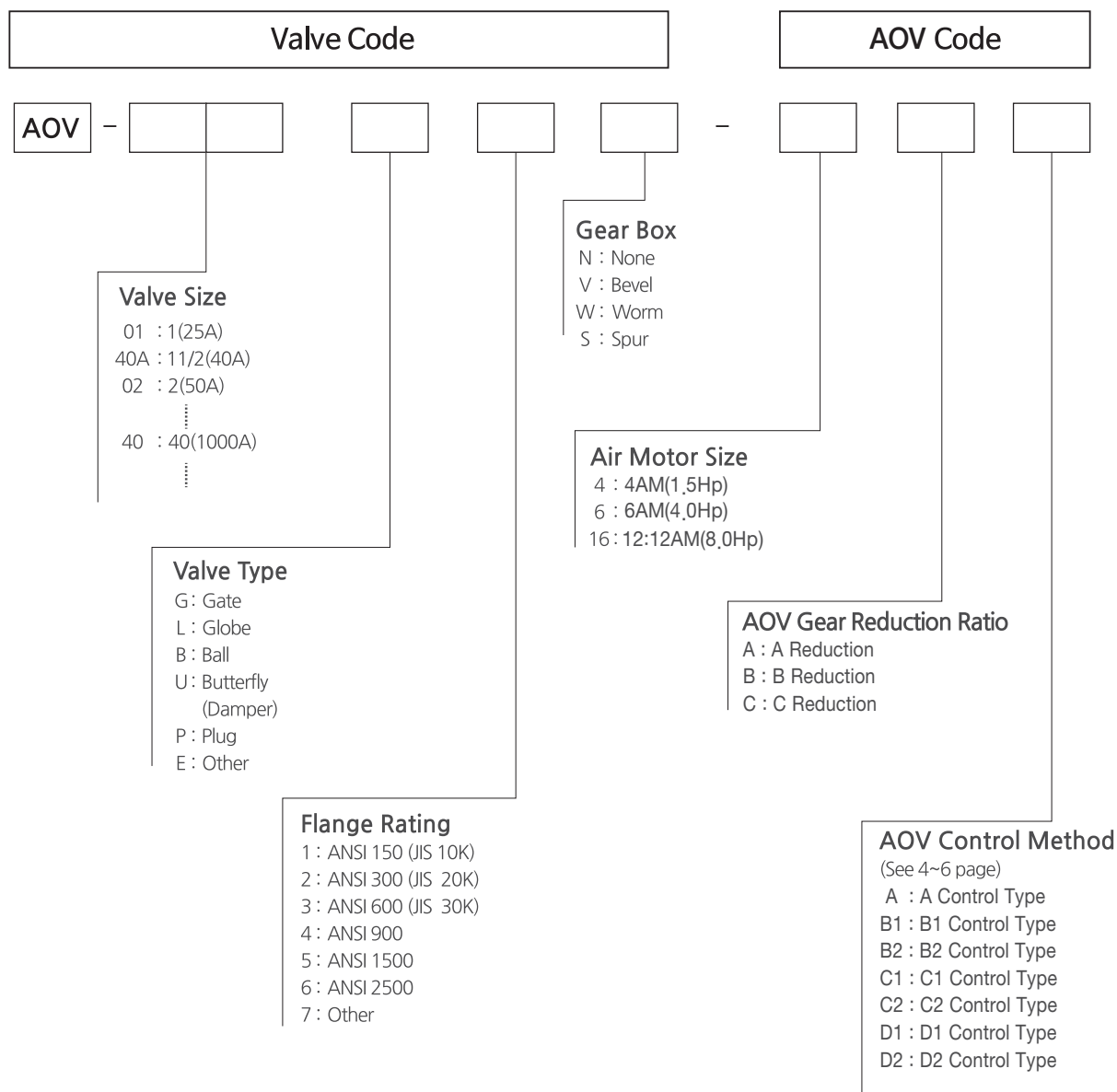
Plug valve may applicable similar with ball valve

## »» Butterfly Valve Torque Calculation Table

| Valve Nominal Diameter [mm] | Minimum Operating Torque (Kg - m) |           |                                |           |                                |           |
|-----------------------------|-----------------------------------|-----------|--------------------------------|-----------|--------------------------------|-----------|
|                             | $\Delta P = 10\text{Kg/cm}^2$     |           | $\Delta P = 7.5\text{Kg/cm}^2$ |           | $\Delta P = 4.5\text{Kg/cm}^2$ |           |
|                             | A (3 m/s)                         | B (6 m/s) | A (3 m/s)                      | B (6 m/s) | A (3 m/s)                      | B (6 m/s) |
| 200                         | 21.4                              | 21.4      | 15.4                           | 15.4      | 8                              | 8         |
| 250                         | 38.3                              | 38.3      | 26.5                           | 26.5      | 14                             | 14        |
| 300                         | 61.9                              | 61.9      | 43.4                           | 43.4      | 22.4                           | 22.4      |
| 350                         | 90.9                              | 90.9      | 64                             | 64        | 33.5                           | 33.5      |
| 400                         | 137                               | 137       | 90.1                           | 90.1      | 47.7                           | 49.6      |
| 450                         | 186                               | 186       | 122                            | 122       | 65.5                           | 70.2      |
| 500                         | 247                               | 247       | 175                            | 175       | 87.3                           | 95.9      |
| 600                         | 403                               | 403       | 272                            | 272       | 147                            | 165       |
| 700                         | 613                               | 613       | 420                            | 420       | 218                            | 257       |
| 800                         | 887                               | 887       | 614                            | 614       | 325                            | 386       |
| 900                         | 1230                              | 1230      | 860                            | 860       | 465                            | 552       |
| 1000                        | 1660                              | 1660      | 1170                           | 1170      | 614                            | 746       |
| 1100                        | 2240                              | 2240      | 1540                           | 1540      | 824                            | 1000      |
| 1200                        | 2870                              | 2370      | 1990                           | 1990      | 1040                           | 1280      |
| 1350                        | 4010                              | 4010      | 2730                           | 2730      | 1460                           | 1820      |
| 1500                        | 5430                              | 5430      | 3740                           | 3740      | 2040                           | 2510      |
| 1600                        | 6540                              | 6540      | 4480                           | 4480      | 2440                           | 3040      |
| 1650                        | 7280                              | 7280      | 5190                           | 5190      | 2900                           | 3655      |
| 1800                        | 9160                              | 9160      | 6270                           | 6270      | 3450                           | 4310      |
| 2000                        | 12370                             | 12370     | 8480                           | 8480      | 4750                           | 5940      |

• Note : The above data are based on the butterfly valves for the water works(KSB-2333)

## AOV Model Selection Guide



EX) AOV-08G1N-6AA : It is 8" Gate Valve ANSI150lbs that has no gear box,  
 It is actuator with 4.0hp air motor that directly controls open/close at site valve.



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