



## INSTRUCTION MANUAL

### SEMI GRADE GATE VALVE MANUAL

**STAINLESS STEEL GV 1.5" ~ 14" (HV & UHV) (PNEUMATIC & MANUAL)**

**SERIAL #** \_\_\_\_\_

**11.2023**

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# Table of Contents

## **1. PRODUCT FEATURE**

- 1.1 Design
  - 1.1.1 Pneumatic
  - 1.1.2 Manual
- 1.2 Function
  - 1.2.1 Disk Assembly configuration
  - 1.2.2 Open
  - 1.2.3 Close
- 1.3 Pneumatic Cylinder

## **2. PRODUCT SPECIFICATION**

- 2.1 Technical specification
- 2.2 Main dimension table
  - 2.2.1 Pneumatic
  - 2.2.2 Manual
- 2.3 Flange dimension table

## **3. MAINTENANCE**

- 3.1 Gate & Bonnet Seal replace (O -ring or Gasket replace)
  - 3.1.1 Pneumatic
  - 3.1.2 Manual
- 3.2 Replace order (Pneumatic, Manua Manual)

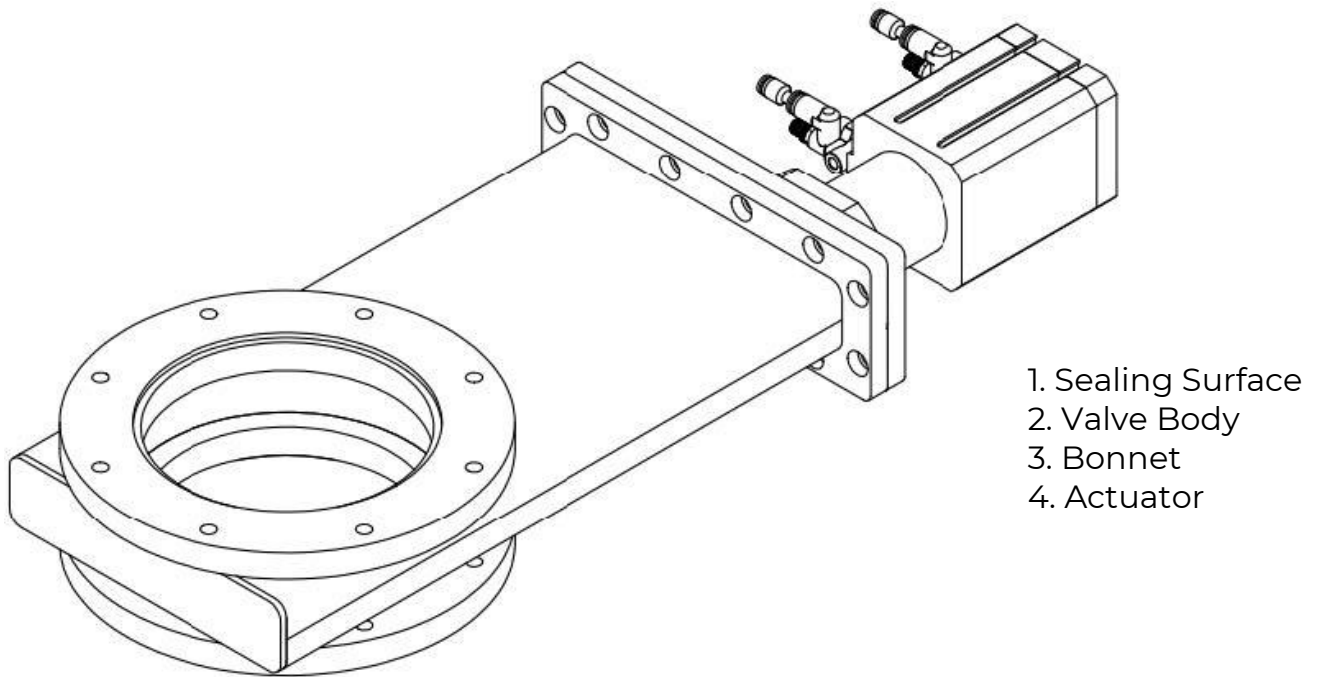
## **4. OPTION**

- 4.1 Open / Close Sensor
  - 4.1.1 Magnetic Reed Sensor
  - 4.1.2 Limit Switch
    - 4.1.2.3 Electronical Connection Diagram
- 4.2 Solenoid Valve
- 4.3 Lock function (Manu Manual)
- 4.4 Special
  - 4.4.1 Solenoid & Magnetic Reed Sensor connection
  - 4.4.2 Angle Valve
  - 4.4.3 All metal fitting

## 1. PRODUCT FEATURE

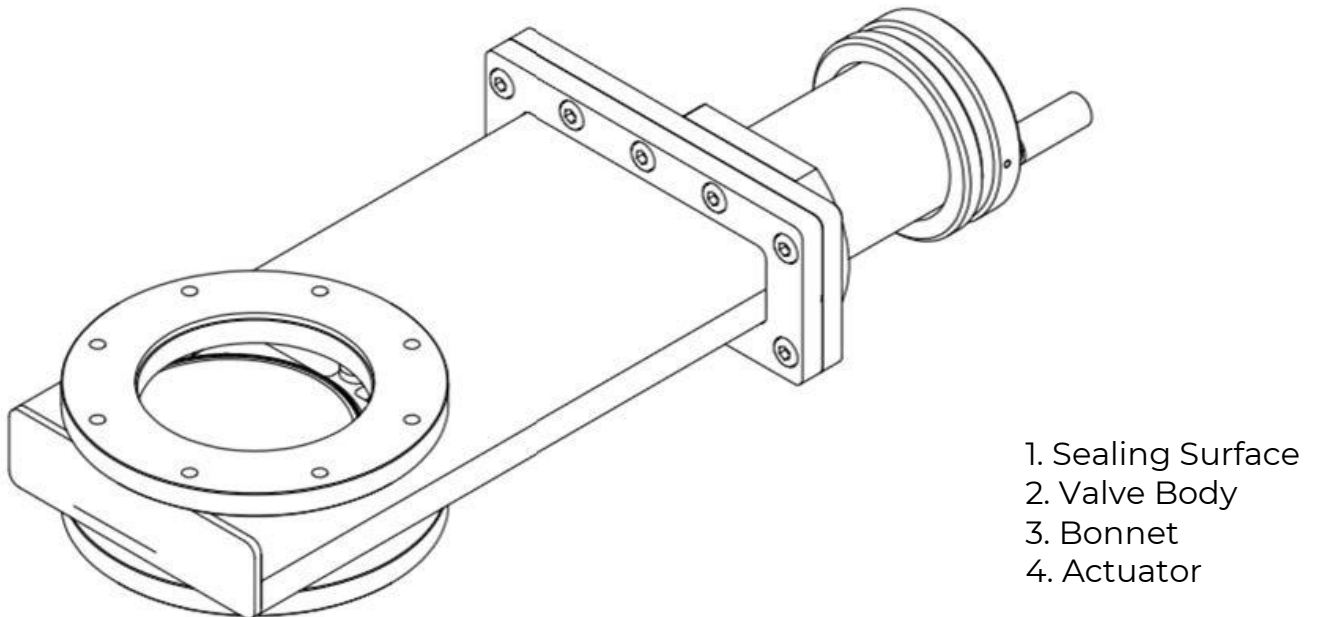
### 1.1 Design

#### 1.1.1 Pneumatic



Picture 1. Pneumatic GV Outline

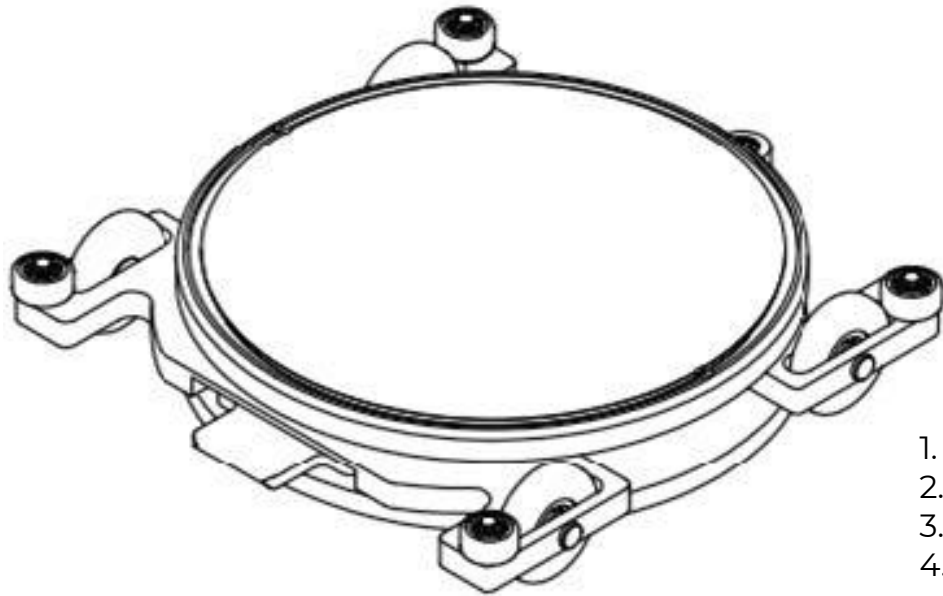
#### 1.1.2 Manual



Picture 2. Manual GV Outline

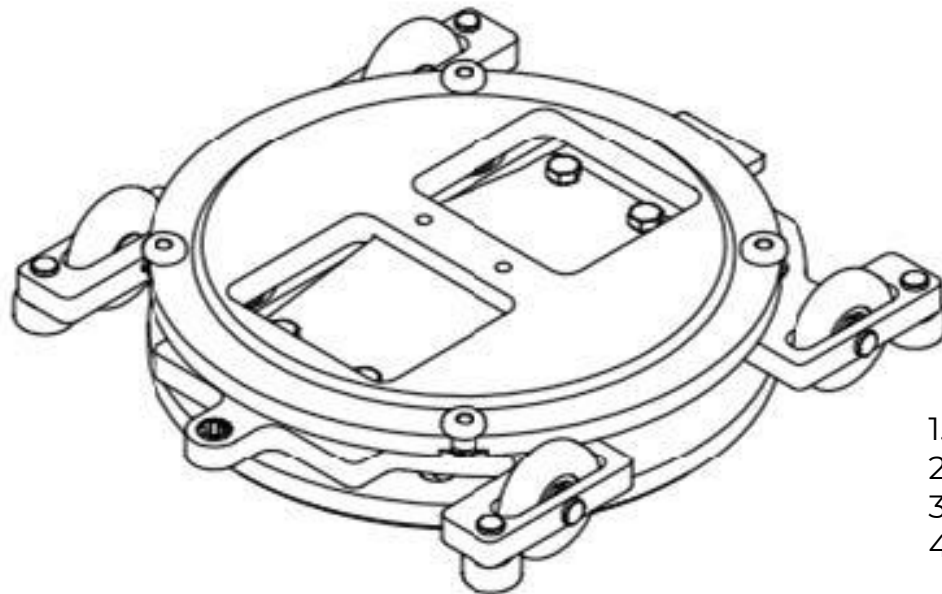
## 1.2 Function

### 1.2.1 Disk Assembly configuration



1. Gate O-Ring
2. Stopper Holder
3. Guide Plate
4. Sealing Disk

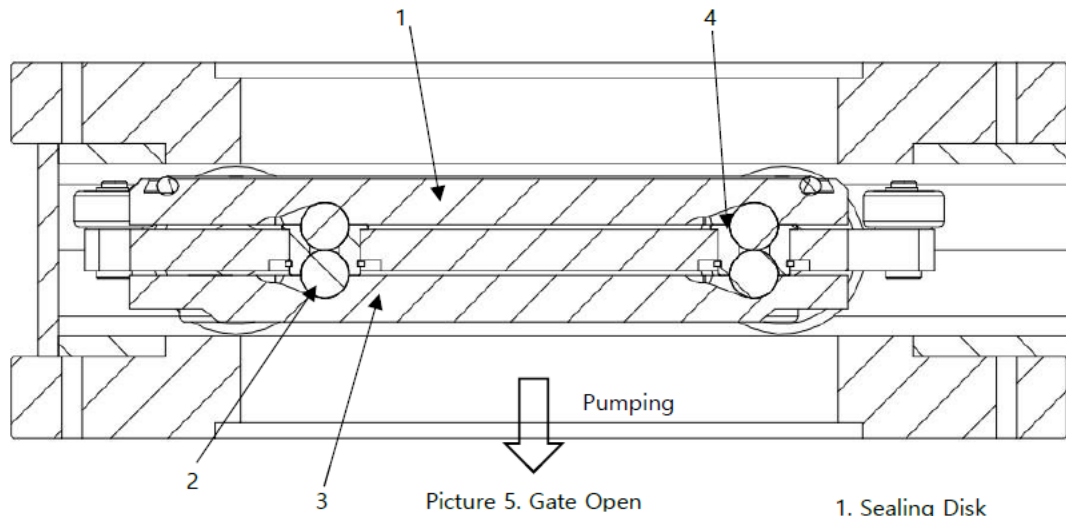
Picture 3. Disk Assembly Outline 1



1. Base Roller
2. Rear Disk
3. Spring
4. Disk Pin

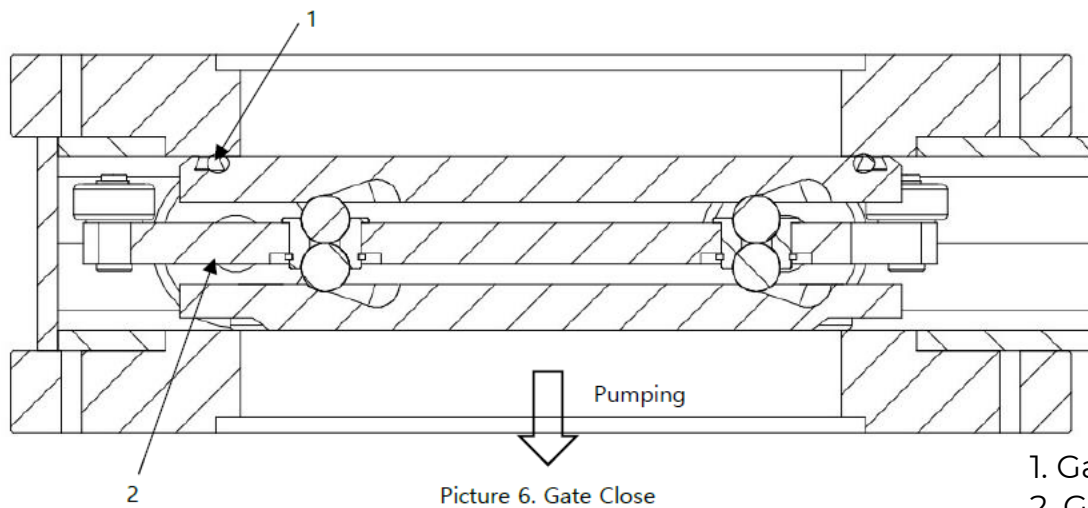
Picture 4. Disk Assembly Outline 2

### 1.2.2 Open



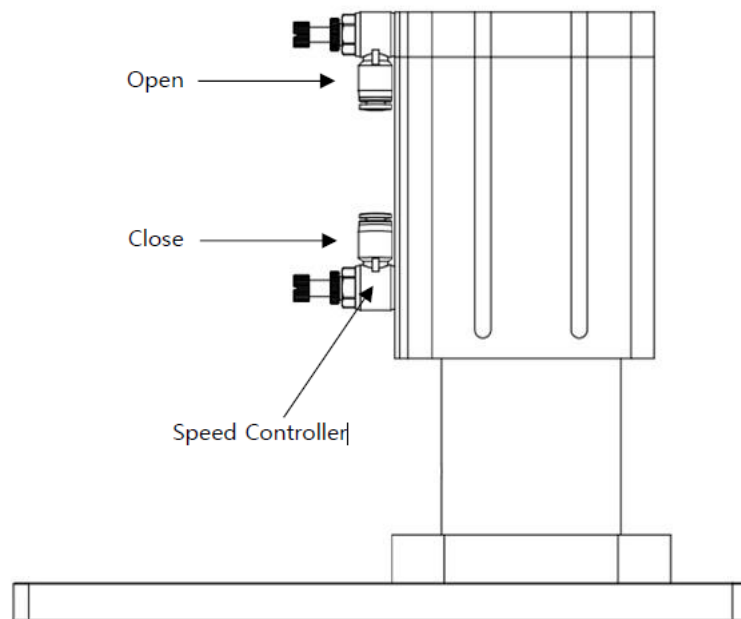
- 1. Sealing Disk
- 2. Ceramic Ball
- 3. Rear Disk
- 4. Ball Holder

### 1.2.3 Close

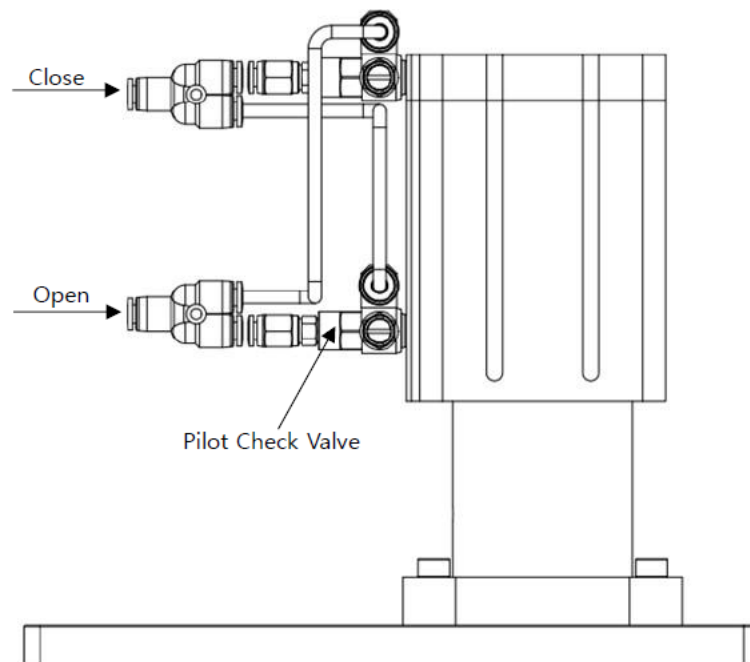


- 1. Gate O-Ring
- 2. Guide Plate

### 1.3 Pneumatic Cylinder



Picture 7. Normal Pneumatic



Picture 8. Special Pneumatic Cylinder

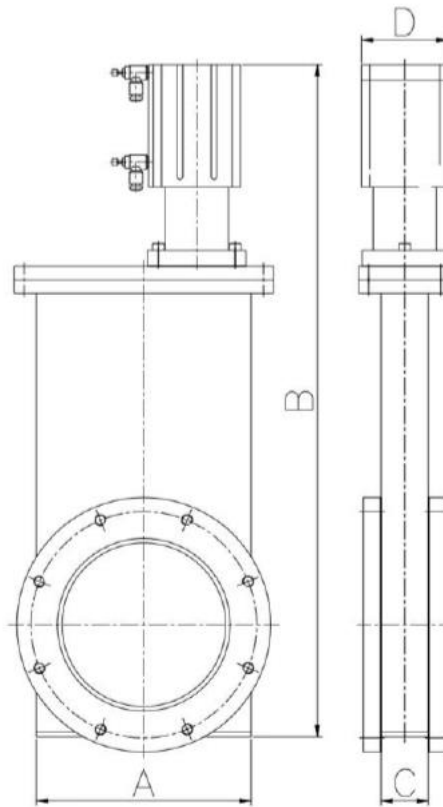
## 2. PRODUCT SPECIFICATION

### 2.1 Technical specification

| Gate Valve Type                    | Circular Gate Valve                                                                                 |
|------------------------------------|-----------------------------------------------------------------------------------------------------|
| Vacuum Level                       | HV / UHV                                                                                            |
| Operation                          | Pneumatic/ Manual                                                                                   |
| Flange Size (ID)                   | 1.5"~14"                                                                                            |
| Flange Type                        | ISO, JIS, ASA, CF                                                                                   |
| Feedthrough                        | Welded Bellows                                                                                      |
| Gate Seal                          | Viton O-Ring/ Kalrez O-Ring / EPDM                                                                  |
| Bonnet Seal                        | Viton O-Ring/ Cu Gasket (UHV)                                                                       |
| Response Time                      | ≤ 2sec                                                                                              |
| Operating Pressure Range           | 1.5" ~ 6" : $1 \times 10^{-10}$ mbar to 1400mbar<br>8" ~ 14" : $1 \times 10^{-10}$ mbar to 1200mbar |
| Differential pressure at opening   | ≤ 30 mbar                                                                                           |
| Differential pressure on the gate  | 1.5" ~ 6" ≤ 1400mbar / 8" ~ 12" ≤ 1200mbar                                                          |
| Leak rate                          | $< 1 \times 9_{-10}$ mbarℓ/sec                                                                      |
| Cycles until first service         | 250,000                                                                                             |
| Temperature for Valve Body         | ≤ 200 °C (HV), ≤ 250 °C (UHV),                                                                      |
| Temperature for Actuator           | ≤ 80 °C (HV), ≤ 150 °C (UHV),                                                                       |
| Temperature for Position Indicator | ≤ 150 °C                                                                                            |
| Bake Temperature                   | ≤ 150 °C (HV), ≤ 200 °C (UHV),                                                                      |
| Materials                          | Body (Stainless Steel 304 or 316L)<br>Actuator (Al 6061 Anodizing)                                  |
| Mounting Position                  | Any                                                                                                 |
| Operating Pressure (N2)            | 4~7 bar                                                                                             |

## 2.2 Main dimension table

### 2.2.1 Pneumatic



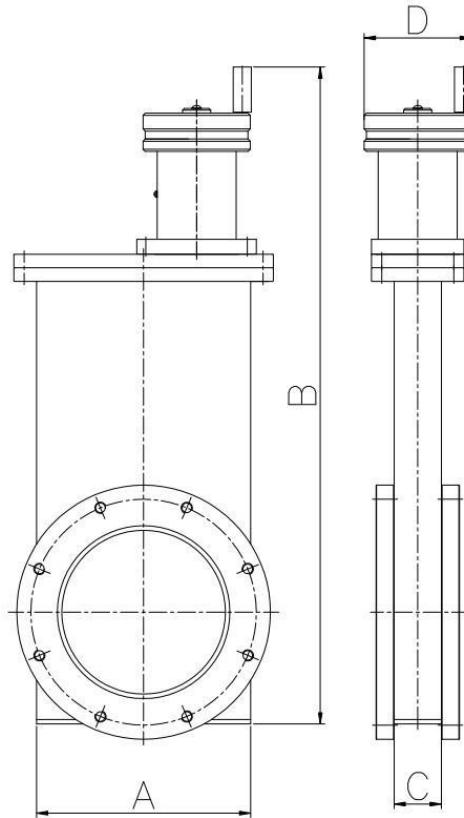
Picture 9. Pneumatic main dimension table

| DN | Mm   | 40    | 50    | 63    | 80    | 100   | 160   | 200   | 250   | 300    | 350   |
|----|------|-------|-------|-------|-------|-------|-------|-------|-------|--------|-------|
|    | Inch | 1.5   | 2     | 2.5   | 3     | 4     | 6     | 8     | 10    | 12     | 14    |
| A  | Mm   | 69.5  | 99.5  | 99.5  | 140   | 148   | 190   | 239   | 294   | 368    | 426   |
|    | Inch | 2.74  | 3.92  | 3.92  | 5.51  | 5.83  | 7.48  | 9.41  | 11.57 | 14.49  | 16.77 |
| B  | Mm   | 257   | 334.5 | 334.5 | 489.5 | 466.5 | 607.5 | 759   | 878.2 | 1079.5 | 1197  |
|    | Inch | 10.12 | 13.17 | 13.17 | 19.27 | 18.37 | 23.92 | 29.88 | 34.57 | 42.5   | 47.13 |
| C  | Mm   | 27    | 32.5  | 32.5  | 40    | 40    | 42    | 42    | 48    | 49.6   | 99.6  |
|    | Inch | 1.06  | 1.28  | 1.28  | 1.57  | 1.57  | 1.65  | 1.65  | 1.89  | 1.95   | 3.92  |
| D  | Mm   | 54    | 72.5  | 56.5  | 64    | 64    | 74    | 74    | 80    | 93.6   | 154   |
|    | Inch | 2.13  | 2.85  | 2.22  | 2.52  | 2.52  | 2.91  | 2.91  | 3.15  | 3.69   | 6.06  |

\*More than 16" contact us



## 2.2.2 Manual

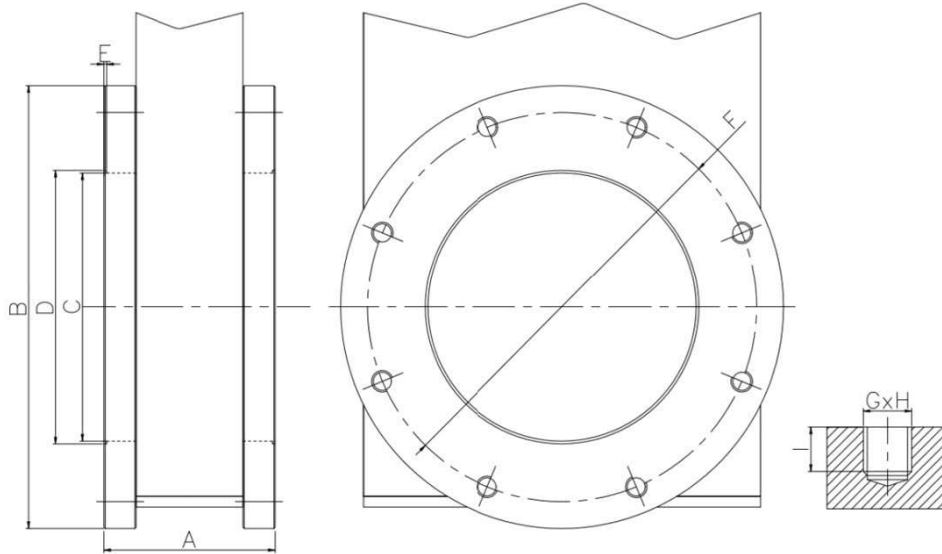


Picture 10. Manual main dimension table

| DN | mm   | 40    | 50    | 63    | 80    | 100   | 160   | 200   | 250   |
|----|------|-------|-------|-------|-------|-------|-------|-------|-------|
|    | inch | 1.5   | 2     | 2.5   | 3     | 4     | 6     | 8     | 10    |
| A  | mm   | 69.5  | 99.5  | 99.5  | 140   | 148   | 190   | 239   | 294   |
|    | inch | 2.74  | 3.92  | 3.92  | 5.51  | 5.83  | 7.48  | 9.41  | 11.57 |
| B  | mm   | 268.7 | 331.7 | 331.7 | 475.2 | 499.2 | 595.2 | 754.5 | 878.2 |
|    | inch | 10.58 | 13.06 | 13.06 | 18.71 | 19.65 | 23.43 | 29.7  | 34.57 |
| C  | mm   | 27    | 32.5  | 32.5  | 40    | 40    | 42    | 42    | 48    |
|    | inch | 1.06  | 1.28  | 1.28  | 1.57  | 1.57  | 1.65  | 1.65  | 1.89  |
| D  | ø    | 65    | 64    | 64    | 95    | 95    | 95    | 99    | 110   |

\* More than 12" contact us

### 2.3 Flange dimension table



Picture 11. ISO Flange dimension table

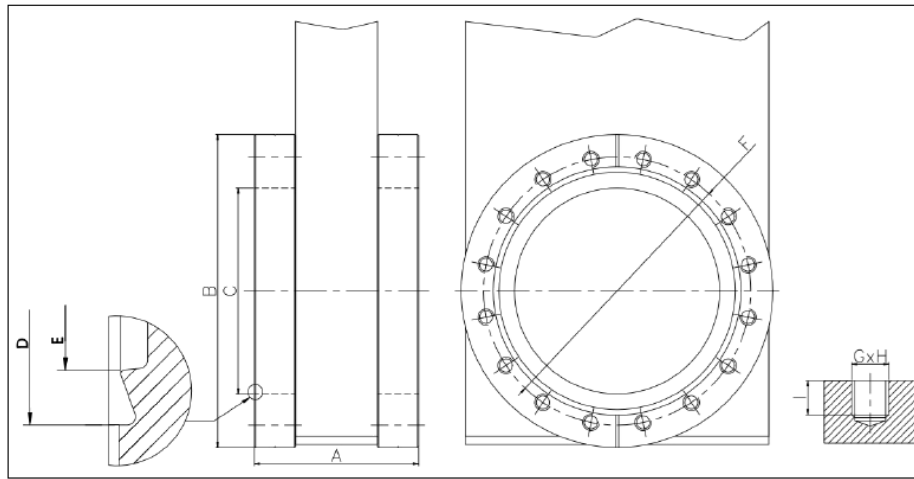
|     |      | ISO-KF   |      | ISO-F |      |      |       |        |        |        |
|-----|------|----------|------|-------|------|------|-------|--------|--------|--------|
| DN  | mm   | 40       | 50   | 63    | 80   | 100  | 160   | 200    | 250    | 300    |
|     | inch | 1.5      | 2    | 2.5   | 3    | 4    | 6     | 8      | 10     | 12     |
| A   | mm   | 69.5     | 99.5 | 99.5  | 140  | 148  | 190   | 239    | 294    | 368    |
|     | inch | 2.7<br>4 | 3.92 | 3.92  | 5.51 | 5.83 | 7.48  | 9.41   | 11.57  | 14.49  |
| B   | mm   | 55       | 75   | 130   | 145  | 165  | 225   | 285    | 335    | 425    |
|     | inch | 2.17     | 2.95 | 5.12  | 5.71 | 6.5  | 8.86  | 11.22  | 13.19  | 16.73  |
| C   | mm   | 38       | 49   | 63.5  | 76.5 | 100  | 145   | 195    | 245    | 305    |
|     | inch | 1.5      | 1.93 | 2.5   | 3.01 | 3.94 | 5.71  | 7.68   | 9.65   | 12.01  |
| D   | mm   | 41.2     | 50.8 | 70    | 83.4 | 102  | 153   | 213    | 261.5  | 318    |
|     | inch | 1.62     | 2    | 2.76  | 3.28 | 4.02 | 6.02  | 8.39   | 10.3   | 12.52  |
| E   | mm   | 3        | 3    | 3     | 3    | 3    | 3     | 3      | 3      | 5      |
|     | inch | 0.12     | 0.12 | 0.12  | 0.12 | 0.12 | 0.12  | 0.12   | 0.12   | 0.2    |
| F   | mm   | -        | -    | 110   | 125  | 145  | 200   | 260    | 309.88 | 395    |
|     | inch | -        | -    | 4.33  | 4.92 | 5.71 | 7.87  | 10.24  | 12.2   | 15.55  |
| GxH |      | -        | -    | 4xM8  | 8xM8 | 8xM8 | 8xM10 | 12xM10 | 12xM10 | 12xM10 |
| I   | mm   | -        | -    | 12    | 12   | 12   | 16    | 16     | 22     | 22     |
|     | inch | -        | -    | 0.47  | 0.47 | 0.47 | 0.63  | 0.63   | 0.87   | 0.87   |

\*ISO-

v.1

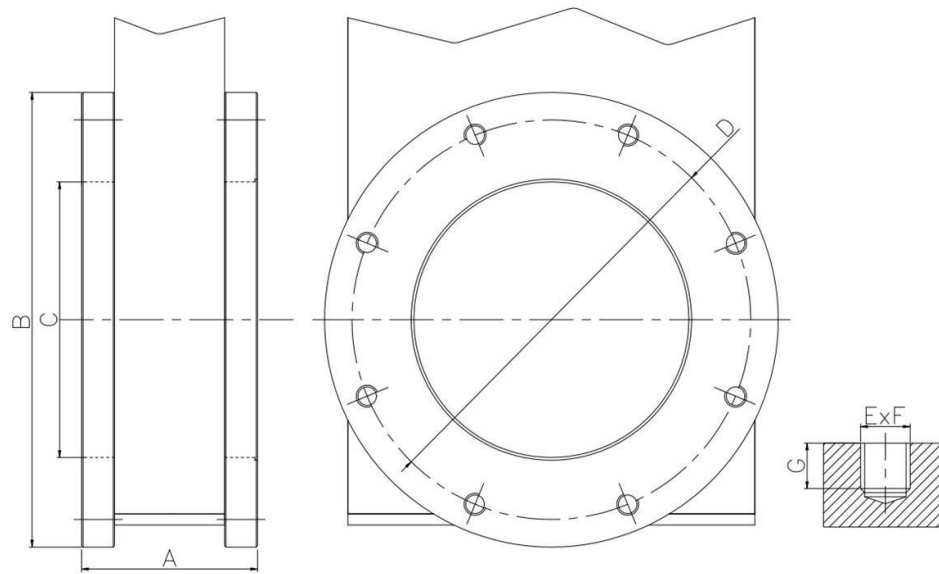
Vacuum Gate Valve

10 |



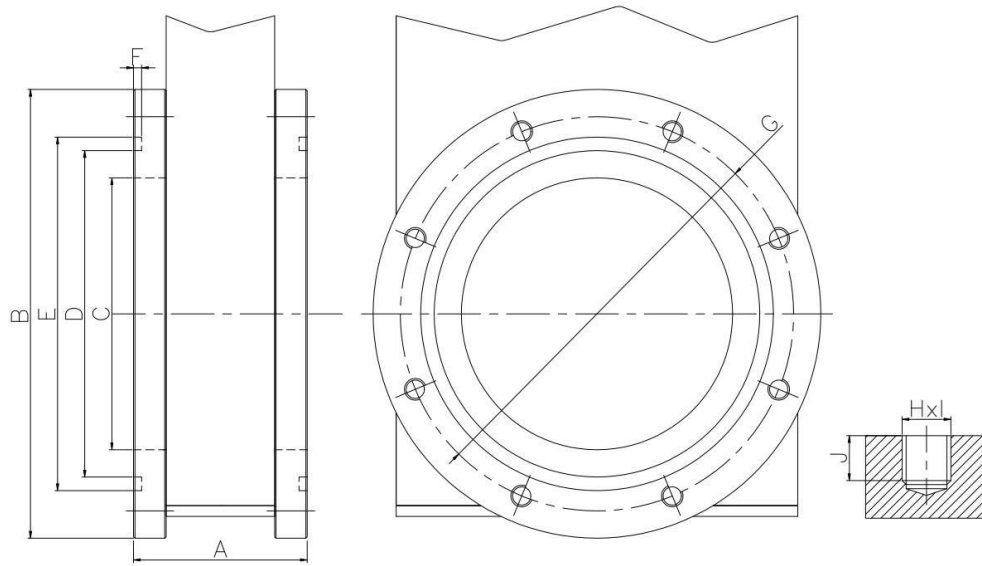
Picture 12. CF Flange dimension table

| CF  |      |      |      |       |            |       |       |       |
|-----|------|------|------|-------|------------|-------|-------|-------|
| DN  | mm   | 40   | 63   | 100   | 160        | 200   | 250   | 300   |
|     | inch | 1.5  | 2.5  | 4     | 6          | 8     | 10    | 12    |
| O.D | inch | 2.75 | 4.5  | 6     | 8          | 10    | 12    | 14    |
| A   | mm   | 52.4 | 67.5 | 80    | 86         | 86    | 104   | 105.6 |
|     | inch | 2.06 | 2.66 | 3.15  | 3.39       | 3.39  | 4.09  | 4.16  |
| B   | mm   | 70   | 114  | 152   | 203        | 253   | 320   | 388   |
|     | inch | 2.76 | 4.49 | 5.98  | 7.99       | 9.96  | 12.6  | 15.28 |
| C   | mm   | 38   | 63.5 | 100   | 145        | 195   | 245   | 305   |
|     | inch | 1.5  | 2.5  | 3.94  | 5.71       | 7.68  | 9.65  | 12.01 |
| D   | mm   | 48.3 | 81.4 | 120.7 | 171.5      | 222.3 | 274   | 313.9 |
|     | inch | 1.9  | 3.2  | 4.75  | 6.75       | 8.75  | 10.79 | 12.36 |
| E   | mm   | 41.9 | 75.1 | 114.3 | 166.2      | 217   | 267.7 | 307.5 |
|     | inch | 1.65 | 2.96 | 4.5   | 6.54       | 8.54  | 10.54 | 12.11 |
| F   | mm   | 58.7 | 92.1 | 130.3 | 181        | 231.8 | 284   | 325.4 |
|     | inch | 2.31 | 3.63 | 5.13  | 7.13       | 9.13  | 11.18 | 12.81 |
| GxH |      | 6xM6 | 8xM8 | 16xM8 | 20xM8<br>8 | 24xM8 | 32xM8 | 30xM8 |
| I   | mm   | 12.7 | 17.5 | 20    | 22         | 22    | 28    | 24    |
|     | inch | 0.5  | 0.69 | 0.79  | 0.87       | 0.87  | 1.1   | 0.94  |
|     |      |      |      |       |            |       |       |       |



Picture 13. ASA Flange dimension table

| ASA |      |       |       |       |       |        |        |
|-----|------|-------|-------|-------|-------|--------|--------|
| DN  | mm   | 63    | 100   | 160   | 200   | 250    | 300    |
|     | inch | 2.5   | 4     | 6     | 8     | 10     | 12     |
| A   | mm   | 57.9  | 65.4  | 74    | 74    | 92     | 103.6  |
|     | inch | 2.28  | 2.57  | 2.91  | 2.91  | 3.62   | 4.08   |
| B   | mm   | 152.4 | 228.6 | 279.4 | 279.4 | 406.4  | 482.6  |
|     | inch | 6     | 9     | 11    | 11    | 16     | 19     |
| C   | mm   | 63.5  | 100   | 145   | 195   | 245    | 305    |
|     | inch | 2.5   | 3.94  | 5.71  | 7.68  | 9.65   | 12.01  |
| D   | mm   | 120.7 | 190.5 | 241.3 | 241.3 | 362    | 431.8  |
|     | inch | 4.75  | 7.5   | 9.5   | 9.5   | 14.25  | 17     |
| ExF |      | 4xM10 | 8xM10 | 8xM20 | 8xM20 | 12xM20 | 12xM20 |
| G   | mm   | 12.7  | 12.7  | 16    | 16    | 22     | 27     |
|     | inch | 0.5   | 0.5   | 0.63  | 0.63  | 0.87   | 1.06   |



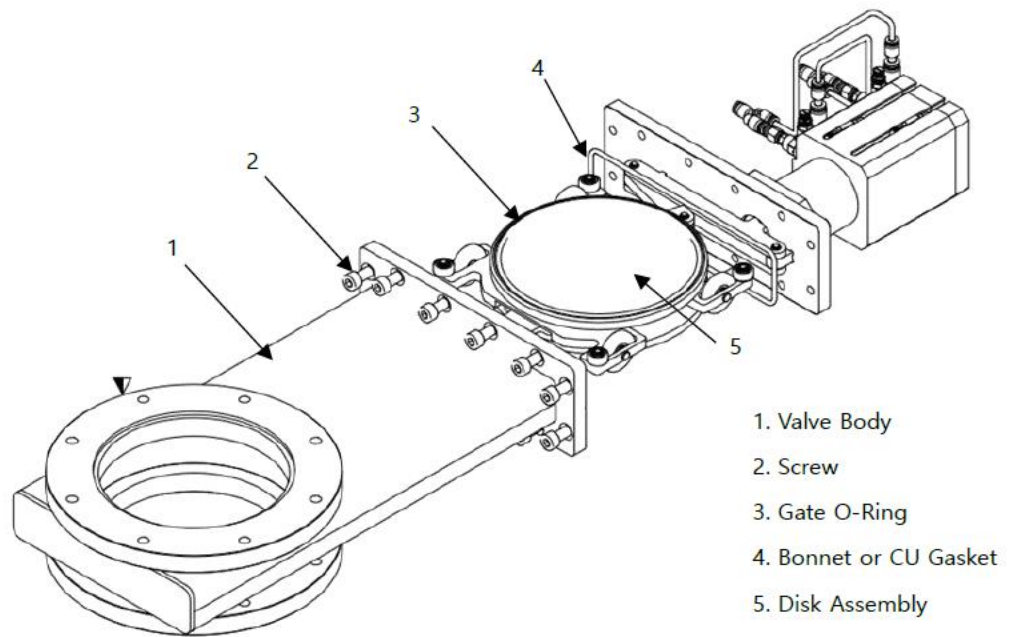
Picture 14. JIS Flange dimension table

| JIS (VF / VG) |      |       |       |       |       |        |        |
|---------------|------|-------|-------|-------|-------|--------|--------|
| DN            | mm   | 63    | 100   | 160   | 200   | 250    | 300    |
|               | inch | 2.5   | 4     | 6     | 8     | 10     | 12     |
| A             | mm   | 56.5  | 64    | 74    | 74    | 84     | 93.6   |
|               | inch | 2.22  | 2.52  | 2.91  | 2.91  | 3.31   | 3.69   |
| B             | mm   | 145   | 185   | 235   | 300   | 350    | 400    |
|               | inch | 5.71  | 7.28  | 9.25  | 11.81 | 13.78  | 15.75  |
| C             | mm   | 63.5  | 100   | 145   | 195   | 245    | 305    |
|               | inch | 2.5   | 3.94  | 5.71  | 7.68  | 9.65   | 12.01  |
| D<br>(VG)     | mm   | -     | 120   | 175   | 225   | -      | 325    |
|               | inch | -     | 4.72  | 6.89  | 8.86  | -      | 12.8   |
| E<br>(VG)     | mm   | -     | 130   | 185   | 241   | -      | 341    |
|               | inch | -     | 5.12  | 7.28  | 9.49  | -      | 13.43  |
| F<br>(VG)     | mm   | -     | 3     | 3     | 4.5   | -      | 4.5    |
|               | inch | -     | 0.12  | 0.12  | 0.18  | -      | 0.18   |
| G             | mm   | 120   | 160   | 210   | 270   | 320    | 370    |
|               | inch | 4.72  | 6.3   | 8.27  | 10.63 | 12.6   | 14.57  |
| HxI           |      | 4xM10 | 8xM10 | 8xM10 | 8xM12 | 12xM12 | 12xM12 |
| J             | mm   | 12    | 12    | 16    | 16    | 18     | 22     |
|               | inch | 0.47  | 0.47  | 0.63  | 0.63  | 0.71   | 0.87   |

### 3. MAINTENANCE

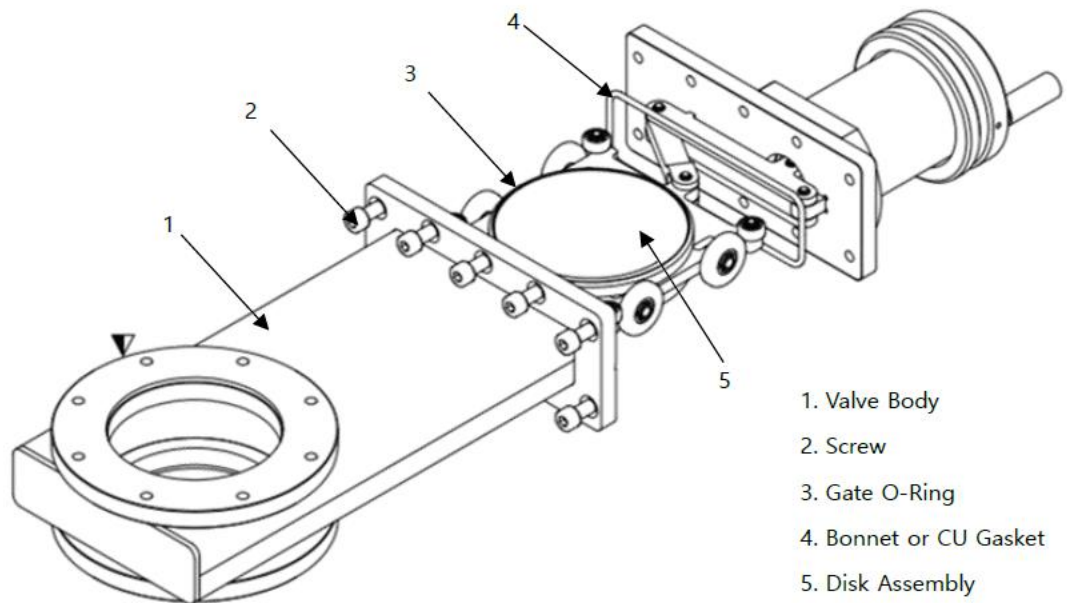
3.1 Replace Gate and Bonnet Seals (Replace O-ring or Cu Gasket for UHV).

#### 3.1.1 Pneumatic



#### 3.1.2 Manual

Picture 15. Pneumatic disassembly



Picture 16. Manual disassembly

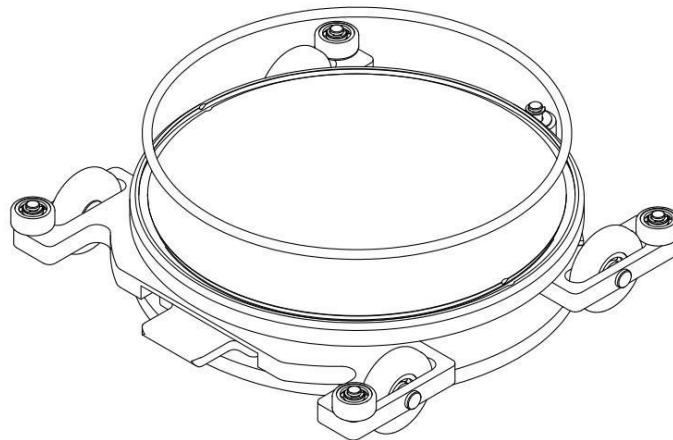
### 3.2 Replace order (Pneumatic, Manual)

#### <Ready>

1. Equalize the pressure rating of the Gate Valve on both sides.
2. Open the Valve
3. Block the air supply.
4. Block the electrical supply.
5. Disassemble the valve from the equipment.

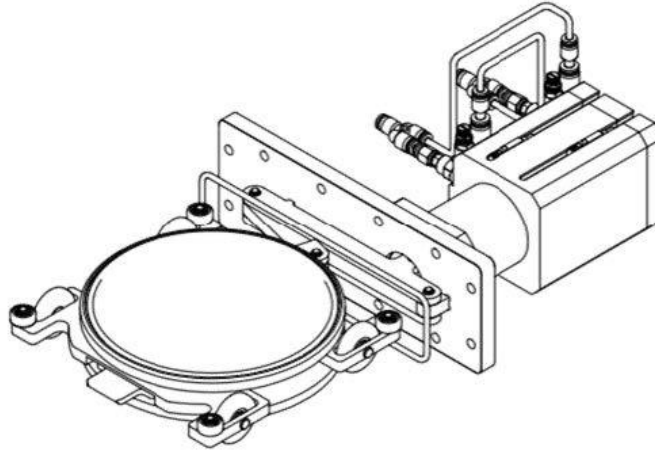
#### <Step>

1. Loosen the Bonnet Screw.  
(Ensure that it is loosened diagonally.)
2. Lift the Valve Body.  
(Be cautious of potential scratches on the Disk Assembly and Valve Body.)
3. Utilize an O-Ring Puller to place the Gate O-Ring into the cracked O-Ring.  
(Exercise caution to prevent scratching the O-Ring groove.)



Picture 17. Gate O-Ring disassemble

4. Begin by pulling up the Gate O-Ring. Utilize a clean room wiper and alcohol to thoroughly clean the Gate O-Ring groove, the sealing surface of the Disk Assembly, and the interior sealing surface of the Valve Body.
5. Proceed to insert the Gate O-Ring after applying vacuum grease.  
(Ensure the Gate O-Ring is properly flattened after insertion.)
6. Remove the Bonnet from the upper part of the O-Ring or Cu Gasket Valve Body.
7. Use an O-Ring Puller to remove the Bonnet O-Ring, and use nippers to handle the Cu Gasket. (Take care to avoid scratching the O-Ring groove.)



Picture 18. Bonnet Seal disassembly

8. After pulling up the Bonnet O-Ring or Cu Gasket, clean the Bonnet O-Ring groove or Gasket Gasket-side clean room using a wiper and alcohol.
9. Once cleaned, apply vacuum grease to the Bonnet O-Ring or insert a new Cu Gasket. (Ensure the O-Ring is inserted correctly.)
10. Assemble the Valve Body while the Disk Assembly is open. (Be cautious of the Bonnet O-Ring potentially falling out of the O-Ring groove.)
11. Securely tighten the Bonnet. (Verify the diagonal alignment of the screws.)
12. Clean the sealing surfaces on the outside of the Valve body, including the Flange, and reuse them.



## 4. OPTION

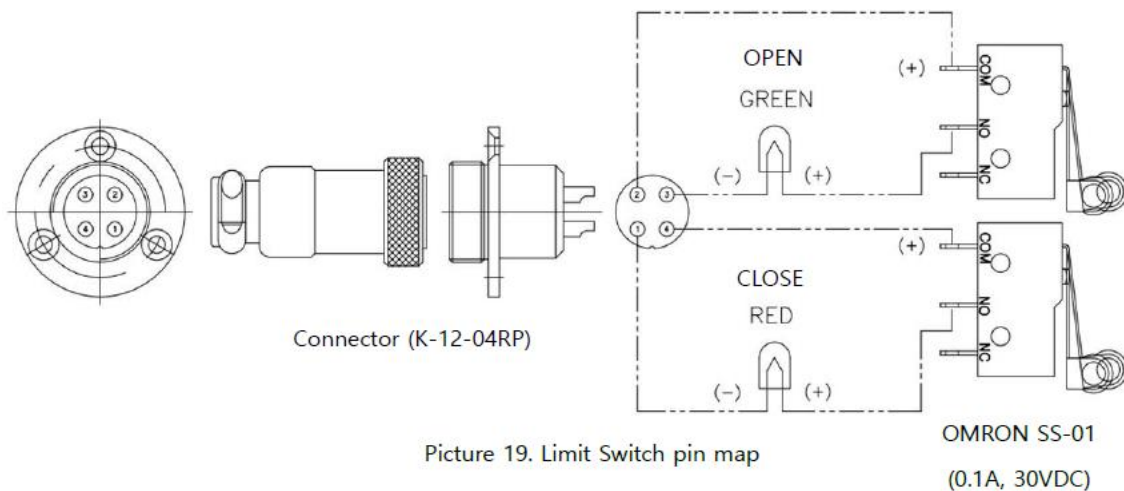
### 4.1 Open / Close Sensor

#### 4.1.1 Magnetic Reed Sensor

| Model                   | D-Y59B (SMC)                      |  |
|-------------------------|-----------------------------------|-------------------------------------------------------------------------------------|
| Wiring method           | 2 ways                            |                                                                                     |
| Applied load            | DC24V relay, PLC                  |                                                                                     |
| Load voltage            | DC24V (DC10~28V)                  |                                                                                     |
| Load current            | 2.5~40mA                          |                                                                                     |
| Internal ground voltage | Less than 4V                      |                                                                                     |
| Leakage current         | Less than 0.8Ma on DC24V          |                                                                                     |
| Indicator lamp          | Red Lightning when the lamp is ON |                                                                                     |
| Specifications          | CE Marking, RoHS                  |                                                                                     |

### 4.1.2 Limit Switch

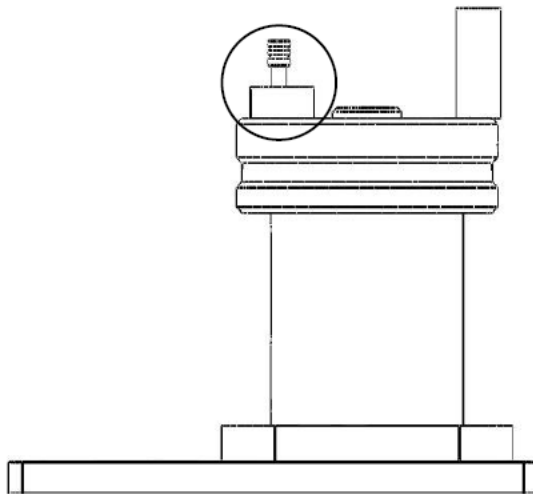
#### 4.1.2.1 Electronical connection diagram



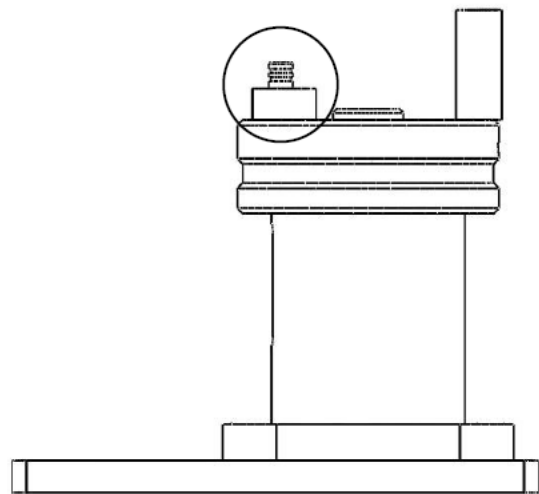
#### 4.2 Solenoid Valve

| Model                                   | KV100, 200 series (SYM)                          |  |
|-----------------------------------------|--------------------------------------------------|-------------------------------------------------------------------------------------|
| Operating pressure                      | 0.15~0.7 Mpa                                     |                                                                                     |
| Ambient and fluid temperature           | Maximum 50°C                                     |                                                                                     |
| Manual operation                        | Push Turn Lock (Push-button type and Lever type) |                                                                                     |
| Shock resistance / Vibration resistance | 150 / 30m/s <sup>2</sup>                         |                                                                                     |
| Protective structure                    | Dust-resistant                                   |                                                                                     |
| Coil rated voltage                      | AC 110V, 220V / DC24V, 12V, 6V                   |                                                                                     |
| Power consumption                       | AC110V : 1VA / AC220V : 2VA / DC : 1W            |                                                                                     |

#### 4.3 Lock function (Manual)



Picture 20. Manual Cylinder Unlock



Picture 21. Manual Cylinder Lock

#### 4.4 Special

##### 4.1 Solenoid & Magnetic Reed Sensor connection



Solenoid Valve + Magnetic Reed Sensor + D-Sub

##### 4.4.2 Attached the Angle Valve



Check the inside of the vacuum rate

##### 4.4.3 All Metal Tubing



STS (Air tube + Speed controller + Fitting)

END