

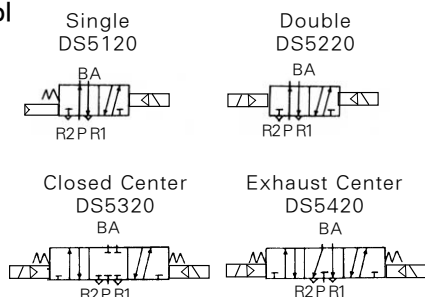
# Series **DS5000**

## Rubber Seal 5 Port Pilot Type • Body Ported Type



- COMPACT SIZE AND LIGHT WEIGHT
- LARGE FLOW CAPACITY
- LOW POWER CONSUMPTION
- DESIGNED FOR NON-LUBRICATED SERVICE

### Symbol



## How to Order

|                                                                                                                                                                                                                                                                                                                                                                                           |                                                                                                                                                                                                                                                                                         |                                                                                                                                                                                                                                                                                                      |                                                                                                                                                                                                                                                                   |
|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <p><b>U</b> DS5 <b>1 2 0 - 1 G</b> <b>0 3</b> - <b>XWL * *</b></p> <p>1 DS5000 Series<br/>Blank : Metric (PT)<br/>U : NPT (UNF)</p> <p>2 Type of Actuation<br/>1 : 2 Position Single Solenoid<br/>2 : 2 Position Double Solenoid<br/>3 : 3 Position Closed Center<br/>4 : 3 Position Exhaust Center</p> <p>3 Body Type<br/>2 : For 20 Type Manifold, Body Ported</p> <p>4 Body Option</p> | <p>0 : Standard<br/>3 : Common Exhaust for Main valve and Pilot valve</p> <p>5 Voltage<br/>1 : AC100V, 50/60Hz<br/>2 : AC200V, 50/60Hz<br/>3 : AC120V, 50/60Hz<br/>4 : AC240V, 50/60Hz<br/>5 : DC24V<br/>6 : DC12V<br/>7 : DC6V</p> <p>6 Electrical Entry/Indicator Light and Surge</p> | <p>Suppressor<br/>G : Grommet (Lead wire length 12 inch)<br/>DZ : DIN Connector With Indicator light and Surge suppressor<br/>D : DIN Connector</p> <p>7 Manual Override<br/>Blank : Non-locking Push type<br/>C : Knob locking type</p> <p>8 Port Size (SUP., CYL.)<br/>02 : 1/4"<br/>03 : 3/8"</p> | <p>04 : 1/2"<br/>(Exhaust Port 3/8")</p> <p>9 Special Option<br/>Blank : Standard type<br/>XC16 : Copper-free</p> <p>10 Length of lead wire<br/>Blank : 300mm (standard)<br/>XWL01 : 100mm<br/>XWL02 : 200mm<br/>XWL20 : 2000mm<br/>Other length : Contact us</p> |
|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|

### Pilot Valve Assembly

SC2 - **1 G** **50** - **XWL \* \***

1 2 3 4 5

|                                                                                                                                                                                                                                                                                                                                                                            |                                                                                                                                                                                                                                                                                                                                         |
|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <p>1 Voltage<br/>1 : AC100V, 50/60Hz<br/>2 : AC200V, 50/60Hz<br/>3 : AC120V, 50/60Hz<br/>4 : AC240V, 50/60Hz<br/>5 : DC24V<br/>6 : DC12V<br/>7 : DC6V<br/>8 : AC24V, 50/60Hz<br/>9 : Other</p> <p>2 Electrical Entry/Indicator Light and Surge Suppression<br/>G : Grommet (Lead wire length 12 inch)<br/>DZ : DIN Connector With Indicator light and Surge suppressor</p> | <p>D : DIN Connector</p> <p>3 Manual Override<br/>Blank : Non - locking Push type<br/>C : Knob locking type</p> <p>4 Special Option<br/>Blank : Standard type<br/>XC16 : Copper-free</p> <p>5 Length of lead wire<br/>Blank : 300mm (standard)<br/>XWL01 : 100mm<br/>XWL02 : 200mm<br/>XWL20 : 2000mm<br/>Other length : Contact us</p> |
|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|

## DS Terminal Box How to Order

DS5120-61-2005- **code**

1

### 1 Code

| Symbol | Voltage               |
|--------|-----------------------|
| 1      | AC 100V               |
| 2      | AC 200V               |
| 3      | AC 120V               |
| 4      | AC 240V               |
| 5      | DC 24V                |
| 6      | DC 12V                |
| 7      | DC 6V                 |
| 8      | Others (DV100V/AC24V) |

### ⚠ Precautions.

Be sure to read before handling. Refer to (Page. B-62) for safety instruction and common.

## Specifications

|                               |                              |                                          |
|-------------------------------|------------------------------|------------------------------------------|
| Fluid                         |                              | Air                                      |
| Operating Pressure Range      | 2 Position Single/3 Position | 0.15~0.9 MPa(21~128 PSI)                 |
|                               | 2 Position Double            | 0.1~0.9 MPa(14~128 PSI)                  |
| Ambient and Fluid Temperature |                              | Max. 50℃(122℉)                           |
| Response Time                 | 2 Position Single/Double     | 40ms or less {0.5 MPa}                   |
|                               | 3 Position                   | 50ms or less {0.5 MPa}                   |
| Max. Operating Frequency      | 2 Position Single/Double     | 5 C/S                                    |
|                               | 3 Position                   | 3 C/S                                    |
| Lubrication                   |                              | Not required                             |
| Manual Override               |                              | Non-Locking Push Type, Knob locking type |
| Mounting Position             |                              | Free                                     |
| Impact/Vibration Resistance   |                              | 30G/5G(8.3~2000Hz)                       |
| Enclosure                     |                              | Dust Proof(IP67)                         |

|                       |            |                                           |
|-----------------------|------------|-------------------------------------------|
| Electrical entry      |            | Grommet, DIN Connector                    |
| Coil Voltages         | AC 50/60Hz | 100 VAC, 200 VAC, 120 VAC, 240 VAC, AC24V |
|                       | DC         | 6 VDC, 12 VDC, 24 VDC                     |
| Allowable Voltage     |            | -15~+10% of Rated Voltage                 |
| Power consumption     | AC         | Inrush 5.6VA(50Hz), 5.0VA(60Hz)           |
|                       |            | Holding 3.4VA(50Hz), 2.3VA(60Hz)          |
|                       | DC         | 1.8W/2W(With LED)                         |
| Indicator Light/Surge | AC         | LED, Varistor                             |
| Suppressor Circuit    | DC         | LED, Varistor                             |

※ If provided, use Turbine Oil 0.1(ISO VG #32)

## Model

inch(mm)

| Piping      | Type                                   | Position Solenoid | (1) Port size<br>Rel/PT/NPT<br>(SUP,CYL.) | Effective orifice inch <sup>2</sup> (Cv factor) |         | (2) Weight · kgf(lbs) |            |
|-------------|----------------------------------------|-------------------|-------------------------------------------|-------------------------------------------------|---------|-----------------------|------------|
|             |                                        |                   |                                           | 3/8"                                            | 1/2"    | 3/8"                  | 1/2"       |
| Body ported | DS5120-○○- <sup>02</sup> <sub>04</sub> | 2/Single          | 1/4"                                      | 50(2.8)                                         | 58(3.2) | 0.38(0.84)            | 0.37(0.82) |
|             | DS5220-○○- <sup>02</sup> <sub>04</sub> | 2/Double          | 3/8"                                      | 50(2.8)                                         | 58(3.2) | 0.48(1.06)            | 0.47(1.04) |
|             | DS5320-○○- <sup>02</sup> <sub>04</sub> | 3/Closed Center   | 1/2"                                      | 40(2.5)                                         | 45(2.5) | 0.59(1.30)            | 0.58(1.28) |
|             | DS5420-○○- <sup>02</sup> <sub>04</sub> | 3/Exhaust Center  |                                           | 43(2.4)                                         | 48(2.7) | 0.59(1.30)            | 0.58(1.28) |

(1) Body Ported Valve can be mounted directly on (Manifold, type/B, Common exhaust)

(2) Exhaust Port is only 3/8"

(3) In case of Body Ported type, Exhaust Port is only 3/8"

## Model for Manifold

| Model                                  | Type       | Exhaust | A, B(CYL')Port |
|----------------------------------------|------------|---------|----------------|
| DS5○20-○○- <sup>03</sup> <sub>04</sub> | B Mount 20 | Common  | Valve          |

DW

DR100

RS

DV1000 ·  
3000 · 4000

DS300

DS3000

DS5000

DS2000

DX2R

DP300 ·  
3000 · 5000

DS6000

DX2

DM

DH

DT220

DC

# Series DS5000

## Manifold

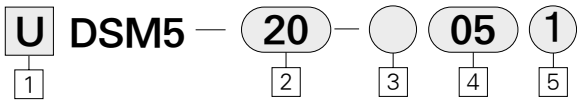


DSM5-20-051

| Manifold Specifications |                | inch (mm) |
|-------------------------|----------------|-----------|
| Manifold type           | B Mount        |           |
| Exhaust                 | Common Exhaust |           |
| Maximum Stations        | 10 Stations    |           |

| Manifold Type | Model   | Exhaust Port | Piping/Port location |      |       | Port Size Rc(PT)/NPT |      |       | Applicable Valve |
|---------------|---------|--------------|----------------------|------|-------|----------------------|------|-------|------------------|
|               |         |              | P                    | R    | A,B   | P                    | R    | A,B   |                  |
| B Mount       | DSM5-20 | Common       | Side                 | Side | Top   | 3/8"                 | 3/8" | 3/8", | DS5○20           |
|               |         |              | Base                 | Base | Valve | 1/2"                 |      | 1/2"  |                  |

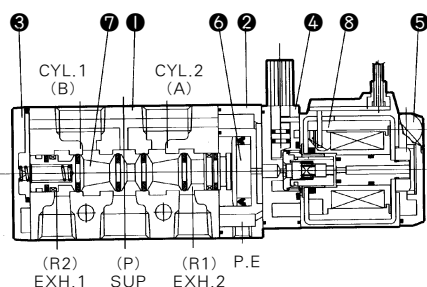
## How to Order Manifold Base



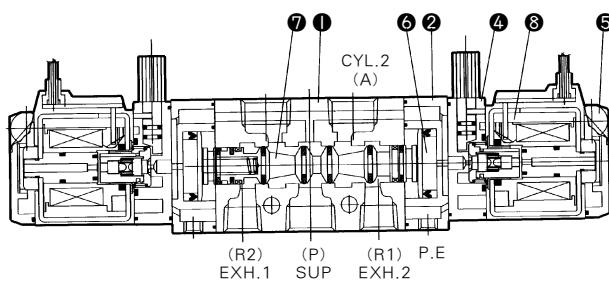
- 1 Manifold for DS5000 series**  
Blank : Metric(PT)  
U : NPT(UNF)
- 2 Manifold Specifications**  
Code : 20 - For Body Ported Valve  
Port location for CYL' port : Valve  
Port size for EXH.
- 3 Thread**  
Blank : Rc(PT)  
G : Rc(PF)
- 4 Stations**  
02 : 2 Stations  
: :  
10 : 10 Stations
- 5 Component Symbol**  
Code : 1  
**Passage**  
P(SUP) : Common  
P(EXH) : Common  
**Piping**  
A,B(CYL') : Top  
Applicable manifold type : 20

# Construction/Parts List

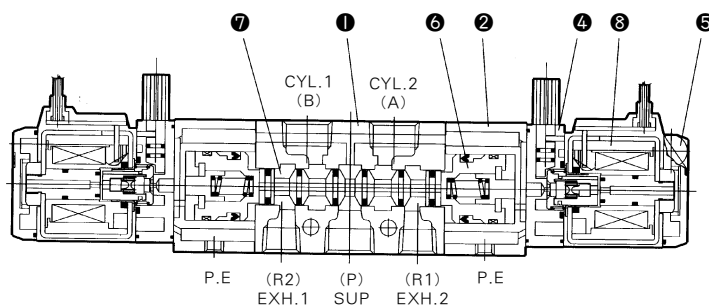
## Single Solenoid



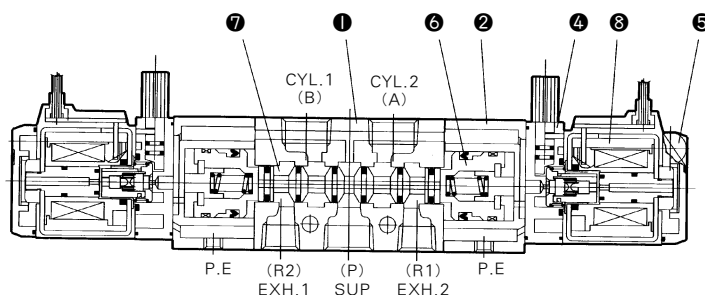
## Double Solenoid



## 3 Position Closed Center



## 3 Position Exhaust Center



### Main Parts

| No. | Description   | Material             | Notes          |
|-----|---------------|----------------------|----------------|
| ①   | Body          | Aluminum Die Casting | Metallic Paint |
| ②   | Adapter Plate | Aluminum Die Casting | Black Paint    |
| ③   | End Cover     | Aluminum Die Casting | Black Paint    |
| ④   | Pilot Body    | Polyacetal           |                |
| ⑤   | Pilot Cover   | Polyacetal           |                |
| ⑥   | Piston        | (*) Polyacetal       |                |
| ⑦   | Spool         | Aluminum · NBR       |                |

※ 3 Position : Aluminum

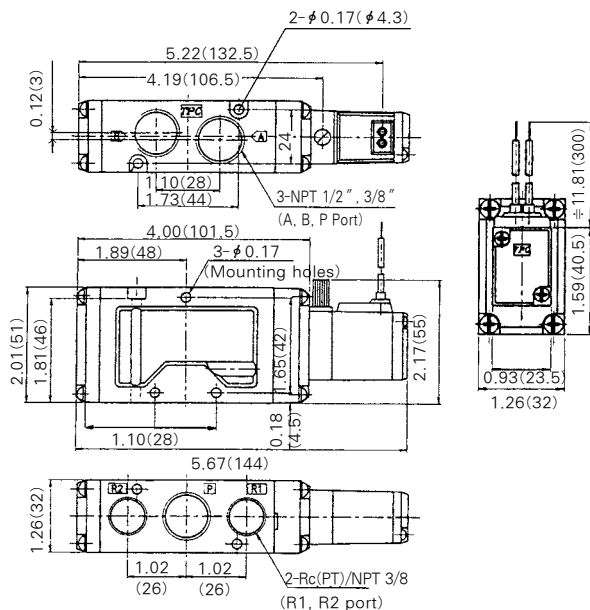
### Spare Parts

| No. | Description       | Material | Notes |
|-----|-------------------|----------|-------|
| ⑧   | Pilot Valve Ass'y | —        |       |

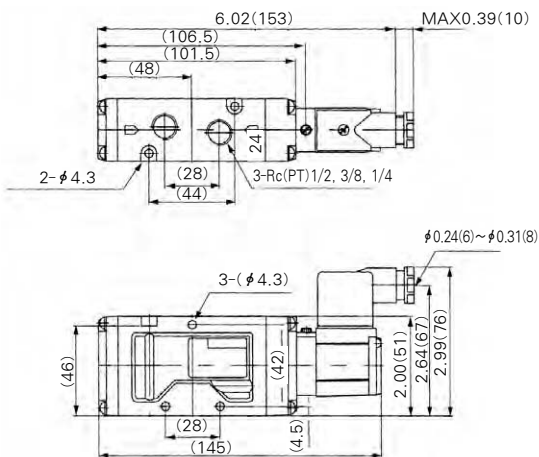
## Body ported/2 Position Single Solenoid

inch(mm)

Grommet/DS512 ○ - ○ GC



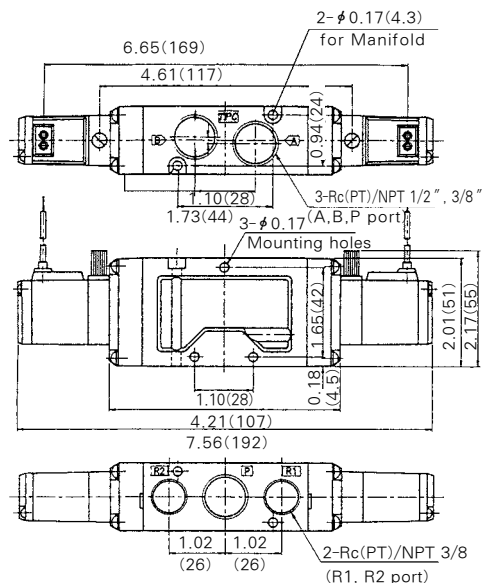
DIN Connector/UDS512 ○ - ○ DZ



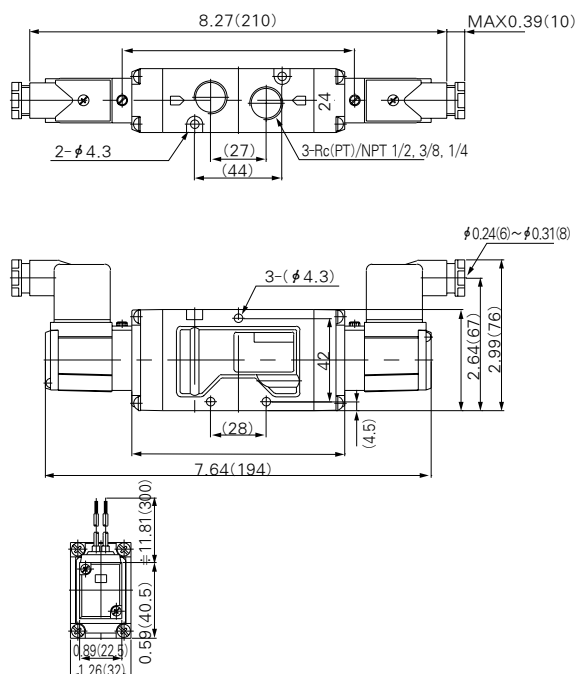
## Body ported/2 Position Double Solenoid

inch(mm)

Grommet/DS5 22 ○ - ○ G



DIN Connector/UDS 5220 ○ - ○ DZ

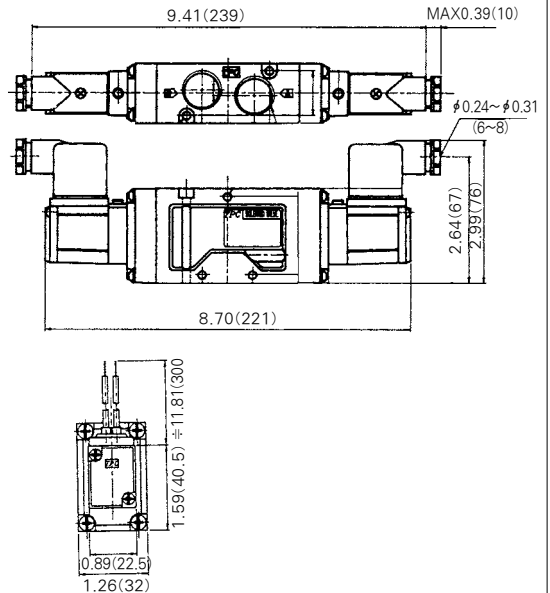
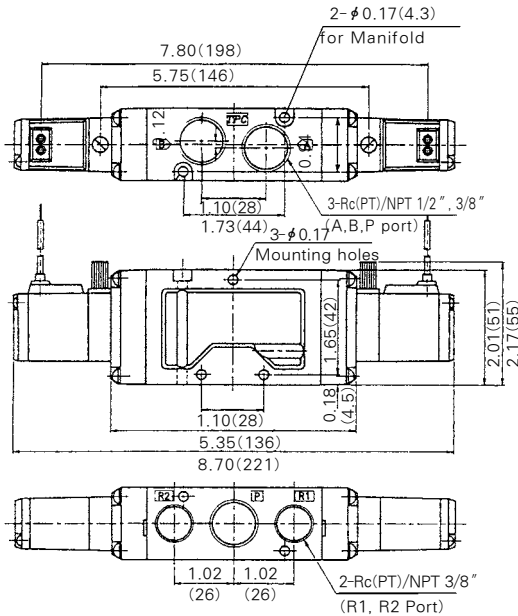


Body ported/3 Position Double Solenoid

inch(mm)

Grommet/DS 5320 - ○G, UDS5420-○G

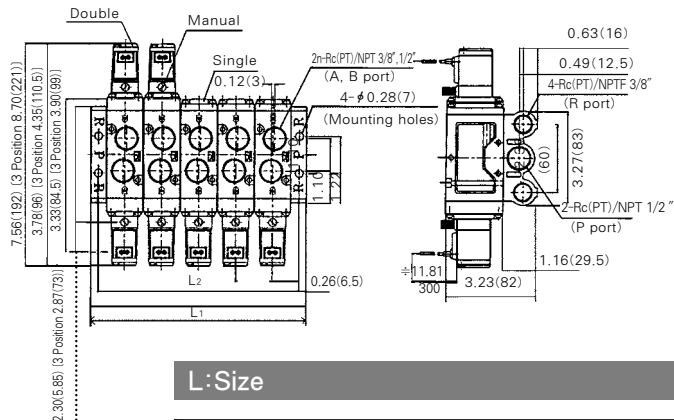
Din Connector / DS5320 - ○DZ  
DS5420 - ○DZ



B Mount Type/Manifold Dimensions DSM5-30

inch(mm)

Common Exhaust/DSM5 - 20 - ○○1



L: Size

n : station NO.

| L \ n | 2        | 3         | 4         | 5         | 6         | 7          | 8          | 9          | 10         |
|-------|----------|-----------|-----------|-----------|-----------|------------|------------|------------|------------|
| L1    | 3.66(93) | 4.96(126) | 6.26(159) | 7.56(192) | 8.86(225) | 10.16(258) | 11.46(291) | 12.76(324) | 14.06(357) |
| L2    | 3.15(80) | 4.45(113) | 5.75(146) | 7.05(179) | 8.35(212) | 9.65(245)  | 10.94(278) | 12.24(311) | 13.54(344) |

DW

DR100

RS

DV1000 ·  
3000 · 4000

DS300

DS3000

DS5000

DS2000

DX2R

DP300 ·  
3000 · 5000

DS6000

DX2

DM

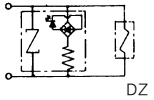
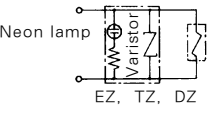
DH

DT220

DC

## ! Precautions

### Indicator light / Surge Voltage Suppressor

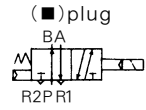
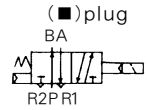
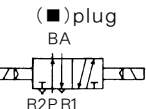
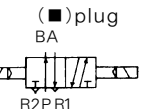
| Rating Voltage | AC, DC                                                                                          |
|----------------|-------------------------------------------------------------------------------------------------|
| 24V less than  | <br>DZ         |
| 200V less than | <br>EZ, TZ, DZ |

(1) Grommet(G) with out lamp

(2) ZNR is called Varistor and it is surge voltage suppressor element.

### Use as a 3 port Valve

Plugging one of the cylinder ports (A or B) enables use as a 3 port valve. The special applications such as a non-leakage valve should not be used. If used as a 3 port valve, it is preferred to make sure the exhaust port is open.

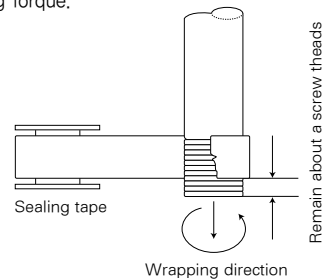
| plug     | B port<br>(CYL.1port)                                                                         | A port<br>(CYL.2port)                                                               |
|----------|-----------------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------|
| Function | N.C                                                                                           | N.O                                                                                 |
| Solenoid | Single<br> |  |
|          | Double<br> |  |

### Quality Of Fluid

- Filtration to 5 microns is enough.
- Incorrect operation of pneumatic products as well as environmental contamination could be caused by large quantity of drainage causes.
- It is preferred to change the compressor oil or install a mist separator when there is a large amount of carbon powder from the compressor.

### Piping

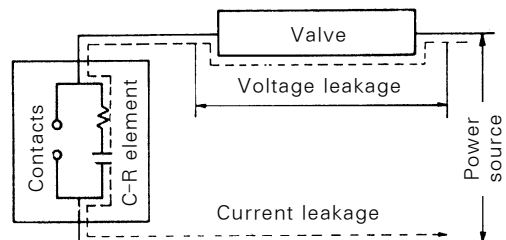
- Prior to piping, it is needed to clean up chips, cutting oil, dust etc.
- It is preferred to ensure that sealant material does not enter the port inside when installing piping of fitting into a port. Be sure to leave 1.5 to 2 threads exposed on the end of piping/fitting when using seal tape.
- As for manifold type, it is preferred to check because manifold type is not provided at PE port by some possibility.
- Tightening torque.



| Therad         | Appropriate tightening<br>Psi(N · m) | Material   |
|----------------|--------------------------------------|------------|
| M3             | 44.08~55.46(0.31~0.39)               | Polyacetal |
|                | 66.83~83.90(0.47~0.59)               | Aluminum   |
| M4             | 106.7~135.1(0.75~0.95)               | Polyacetal |
|                | 163.5~206.2(1.15~1.45)               | Aluminum   |
| M5             | 213.3~284.4(1.5~2)                   | Polyacetal |
| Rc(PT)/NPT 1/8 | 995.4~1279.8(7~9)                    | Aluminum   |
| Rc(PT)/NPT 1/4 | 1706.4~1990.8(12~14)                 |            |

### Leakage Voltage

- It is needed to make sure that residual leakage voltage of AC coil must be less than 20% of the rated voltage for the leakage current, and when the switch is off, leakage voltage of DC coil must be less than 3% of the rated voltage.
- The leakage voltage could increase when using a C-R element.



## Operating Environment

### Warning

- ① The use in atmospheres where the valve is in direct contact with corrosive gases, chemicals, salt water, water or steam should be avoided.
- ② In event that it is used in atmosphere where there is possible contact with water drop-lets, oil, weld spatter, etc., it is preferred to take suitable preventative measures.
- ③ The use in a place subject to heavy vibrations and/or shocks should be avoided. Be sure to check the specifications for each series.

## Use at Low Temperature

It is possible to use under 14" F(-10°C), but it is needed to take care so as to protect against freezing moisture.

## Momentary Energizing

Be sure to check that the energizing time is more than 0.05 seconds when using a Double Solenoid type with momentary energizing.

## Long periods of continuous energization

When the valve is to be continuously energized for a long periods, be sure to contact TPC.

## How to find the flow rate (At an temperature 20°C)

Subsonic flow :  $P_1 + 0.1013 < 1.89(P_2 + 0.1013)$

$$Q = 226S \sqrt{\Delta P(P_2 + 0.1013)}$$

Subsonic flow :  $P_1 + 0.1013 \geq 1.89(P_2 + 0.1013)$

$$Q = 113S \sqrt{\Delta P(P_1 + 0.1013)}$$

Q : Flow rate ( l /min(ANR))

S : Effective area(mm<sup>2</sup>)

ΔP : Pressure differential(P<sub>1</sub>-P<sub>2</sub>)(MPa)

P<sub>1</sub> : Upstream pressure(MPa)

P<sub>2</sub> : Downstream pressure(MPa)

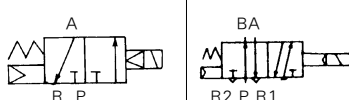
※ Multiply the flow rate calculated with the above formula by the following coefficient for compensation when the air temperature is different.

|                         |      |      |      |      |      |      |      |      |
|-------------------------|------|------|------|------|------|------|------|------|
| Air temperature(°C)     | -20  | -10  | 0    | 10   | 30   | 40   | 50   | 60   |
| Coeff. for compensation | 1.08 | 1.06 | 1.04 | 1.02 | 0.98 | 0.97 | 0.95 | 0.94 |

## Lubrication

- ① For the valve, it is needed to fabricate for life at manufacture, and it does not require lubrication in service.
- ② Be sure to use turbine oil class 1(ISO VG32) in event that a lubricant is used in the system.  
With the use of other lubricant oil, malfunction could result. Be sure to contact us for suggested turbine oil class 2(ISO VG32).

## Remark

| Port                        | DS300                                                                              | DS3000, DS5000       |
|-----------------------------|------------------------------------------------------------------------------------|----------------------|
| Supply                      | P(SUP)                                                                             |                      |
| Cylinder                    | A(CYL)                                                                             | A(CYL.2), 및 B(CYL.1) |
| Exhaust                     | R(EXH)                                                                             | R1(EXH2), 및 R2(EXH1) |
| Symbol<br>(Single Solenoid) |  |                      |
|                             | S:P(SUP)                                                                           |                      |