5 Port Pilot Operated Solenoid Valve Metal Seal, Plug-in/Non Plug-in

Series VFS4000

Compact yet provides a large flow capacity: 1/2: C: 12 dm³/(s·bar)

Low power consumption: 1.8 W DC

Easy maintenance

2 types of sub-plates:
Plug-in and non plug-in

Standard Specifications

<table>
<thead>
<tr>
<th>Fluid</th>
<th>Air/inert gas</th>
</tr>
</thead>
<tbody>
<tr>
<td>Maximum operating pressure</td>
<td>1.0 MPa</td>
</tr>
<tr>
<td>Minimum operating pressure 2 position</td>
<td>0.1 MPa</td>
</tr>
<tr>
<td>Minimum operating pressure 3 position</td>
<td>0.15 MPa</td>
</tr>
<tr>
<td>Proof pressure</td>
<td>1.5 MPa</td>
</tr>
<tr>
<td>Ambient and fluid temperature</td>
<td>–10 to 60°C</td>
</tr>
<tr>
<td>Lubrication</td>
<td>Non-lube</td>
</tr>
<tr>
<td>Pilot valve manual override</td>
<td>Non-locking push type (Flush)</td>
</tr>
<tr>
<td>Shock/Vibration resistance</td>
<td>150/50 m/s²</td>
</tr>
<tr>
<td>Enclosure</td>
<td>Type E: Dustproof (level 0), Type F: Dripproof (level 2), Type D: Splashproof (level 4)</td>
</tr>
<tr>
<td>Coil rated voltage</td>
<td>100, 200 VAC, 50/60 Hz; 24 VDC</td>
</tr>
<tr>
<td>Allowable voltage fluctuation</td>
<td>–15 to +10% of rated voltage</td>
</tr>
<tr>
<td>Coil insulation type</td>
<td>Class B or equivalent (130°C)</td>
</tr>
</tbody>
</table>

Electrical specifications

| Power consumption AC | 1.8 W (2.04 W) |
| Inrush Holding | 5.6 VA/50 Hz, 5.0 VA/60 Hz |
| Power consumption DC | 1.8 W (2.04 W) |

Note 1) Use dry air at low temperatures.
Note 2) Use turbine oil Class 1 (ISO VG32), if lubricated.
Note 3) Impact resistance: No malfunction occurred when it is tested with a drop tester in the axial direction and at the right angles to the main valve and armature in both energized and de-energized states every once for each condition. (Values at the initial period)

Vibration resistance: No malfunction occurred in a one-sweep test between 45 and 2000 Hz. Test was performed at both energized and de-energized states in the axial direction and at the right angles to the main valve and armature. (Values at the initial period)

Note 4) Based on JIS C 0920.
Note 5) Based on JIS C 4003.

Option Specifications

| Pilot type | External pilot (Note) |
| Manual override | Direct manual override |
| Pilot valve | Non-locking push type (Extended), Locking type (Tool required), Locking type (Lever) |
| Coil rated voltage | 110 to 120, 220, 240 VAC, 50/60 Hz |
| Porting specifications | Bottom ported |
| Option | With light/surge voltage suppressor, Non-rotating DIN terminal |

Note) Operating pressure: 0 to 1.0 MPa
Pilot pressure 2 position: 0.1 to 1.0 MPa, 3 position: 0.15 to 1.0 MPa

---

Note 1) Based on JIS B 8375 (once per 30 days) for the minimum operating frequency. Note 2) Based on JIS B 8375-1981 (The value at supply press. 0.5 MPa).
Note 3) The figures in the above list are for without sub-plate. In the case of with plug-in sub-plate and with non plug-in sub-plate, add 0.50 kg and 0.43 kg respectively. Note 4) “Note 1)” and “Note 2)” are with controlled clean air.

JIS Symbol

2 position

Single

Closed center

Double

Exhaust center

Pressure center

Double check

3 position

Model

<table>
<thead>
<tr>
<th>Type of actuation</th>
<th>Plug-in</th>
<th>Non plug-in</th>
</tr>
</thead>
<tbody>
<tr>
<td>2 position</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Single</td>
<td>VFS4100</td>
<td>VFS4110</td>
</tr>
<tr>
<td>Closed center</td>
<td>VFS4300</td>
<td>VFS4310</td>
</tr>
<tr>
<td>Exhaust center</td>
<td>VFS4400</td>
<td>VFS4410</td>
</tr>
<tr>
<td>Pressure center</td>
<td>VFS4500</td>
<td>VFS4510</td>
</tr>
<tr>
<td>Double check</td>
<td>VFS4600</td>
<td>VFS4610</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Port size</th>
<th>1/2</th>
<th>3/8</th>
</tr>
</thead>
<tbody>
<tr>
<td>C [dm³/(s·bar)]</td>
<td>b</td>
<td>C [dm³/(s·bar)]</td>
</tr>
<tr>
<td>1/2</td>
<td>12</td>
<td>0.22</td>
</tr>
<tr>
<td>3/8</td>
<td>11</td>
<td>0.20</td>
</tr>
<tr>
<td>1/2</td>
<td>12</td>
<td>0.22</td>
</tr>
<tr>
<td>3/8</td>
<td>11</td>
<td>0.20</td>
</tr>
</tbody>
</table>

Max operating cycle (rpm)

| 1,000 | 1,200 |
| 40 or less | 15 or less |

Weight (kg)

| 0.63 | 0.75 |
| 0.82 | 0.82 |
| 1.71 | 0.82 |

Note 1) Based on JIS B 8375 (once per 30 days) for the minimum operating frequency. Note 2) Based on JIS B 8375-1981 (The value at supply press. 0.5 MPa).
Note 3) The figures in the above list are for without sub-plate. In the case of with plug-in sub-plate and with non plug-in sub-plate, add 0.50 kg and 0.43 kg respectively. Note 4) “Note 1)” and “Note 2)” are with controlled clean air.
How to Order

Body type

0: Plug-in type sub-plate
1: Non plug-in type sub-plate

Electrical entry

F: Plug-in type conduit terminal
G: Non plug-in type conduit terminal

Porting specifications

Nil
B: Side ported
C: Bottom ported
+ In the case of external pilot (Option), bottom piping is not available.

Electrical entry

Option

None
With light/surge voltage suppressor
Non-rotating DIN terminal

* In the case of w/ "Z", enter "ZP"
Type "P" is available for DIN type only.

Pilot valve

Manual override

Nil: Non-locking push type (Flush)
A: Non-locking push type (Extended)
B: Locking type (Tool required)
C: Locking type (Lever)

Body type

Body option

0: Standard
1: Direct manual override
+ Option

Coil rated voltage

1: 100 VAC, 50/60 Hz
2: 200 VAC, 50/60 Hz
3: 110 to 120 VAC, 50/60 Hz
4: 220 VAC, 50/60 Hz
5: 24 VDC
6: 12 VDC
7: 240 VAC, 50/60 Hz
8: Other

+ Option

Thread type

N: NPT
T: NPTF
P: G

* Option

How to Order Pilot Valve Assembly

SF4 1 F 30

Coil rated voltage

1: 100 VAC, 50/60 Hz
2: 200 VAC, 50/60 Hz
3: 110 to 120 VAC, 50/60 Hz
4: 220 VAC, 50/60 Hz
5: 24 VDC
6: 12 VDC
7: 240 VAC, 50/60 Hz
8: Other

+ Option

Manual override

Nil: Non-locking push type (Flush)
A: Non-locking push type (Extended)
B: Locking type (Tool required)
C: Locking type (Lever)

+ Option

Refer to page 3-8-5 for voltage conversion.
Can hold an intermediate cylinder position for an extended time

If the double check spacer with a built-in double check valve is combined, it will enable the cylinder to stop in the intermediate stroke and maintain its position for a long time without being affected by the leakage between the spools.

### System Components

<table>
<thead>
<tr>
<th>System</th>
<th>Solenoid valve</th>
<th>Speed controller</th>
<th>Silencer</th>
<th>SGP (Steel pipe) Port size x Length</th>
</tr>
</thead>
<tbody>
<tr>
<td>A</td>
<td>Series VFS4000</td>
<td>AS420-03 (S = 73 mm²)</td>
<td>AN300-03 (S = 60 mm²)</td>
<td>10 A x 1</td>
</tr>
<tr>
<td>B</td>
<td>Series VFS4000</td>
<td>AS420-04 (S = 57 mm²)</td>
<td>AN400-04 (S = 90 mm²)</td>
<td>15 A x 1</td>
</tr>
</tbody>
</table>

### Double Check Spacer/Specifications

- **Caution**
  - In the case of 3 position double check valve (VFS4100), check the leakage from piping and fittings in between valve and cylinder by means of synthetic detergent solutions, and ensure that there is no such leakage found there. Also check the leakage from cylinder seal and piston seal. If there is any leakage, sometimes the cylinder, when valve is de-energized, can move without stopping at intermediate position.
  - Be aware that if the exhaust side is restricted excessively, the intermediate stopping accuracy will decrease and will lead to improper intermediate stops.

### Check Valve Operation

- The combination of VFS4110, VFS4210 and Double check spacer for prevention of falling at the stroke end but cannot hold the intermediate position of the cylinder.

---

**Specifications**

<table>
<thead>
<tr>
<th>Double check spacer part no.</th>
<th>Plug-in type</th>
<th>Non plug-in type</th>
</tr>
</thead>
<tbody>
<tr>
<td>VFS4000-22A-1</td>
<td>VFS4400-22A-2</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Applicable valve model</th>
<th>VFS4400-C-E</th>
</tr>
</thead>
<tbody>
<tr>
<td>VFS4410-D-E</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Leakage * (cm³/min)</th>
<th>Solenoid one side energized</th>
<th>Solenoid both sides de-energized</th>
</tr>
</thead>
<tbody>
<tr>
<td>P</td>
<td>EA 230 or less</td>
<td>EA 230 or less</td>
</tr>
<tr>
<td>E</td>
<td>EB 0</td>
<td>EB 0</td>
</tr>
</tbody>
</table>

* Supply pressure: 0.5 MPa

---

**Use as a guide for selection. Please confirm the actual conditions with SMC Sizing Program.**
Series VFS4000

Construction

2 position single

2 position double

3 position closed center/exhaust center/pressure center

Component Parts

<table>
<thead>
<tr>
<th>No.</th>
<th>Description</th>
<th>Material</th>
<th>Note</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Body</td>
<td>Aluminum die-casted</td>
<td>Platinum silver</td>
</tr>
<tr>
<td>2</td>
<td>Sub-plate</td>
<td>Aluminum die-casted</td>
<td>Platinum silver</td>
</tr>
<tr>
<td>3</td>
<td>Spool/Sleeve</td>
<td>Stainless steel</td>
<td>—</td>
</tr>
<tr>
<td>4</td>
<td>Adapter plate</td>
<td>Aluminum die-casted</td>
<td>Black</td>
</tr>
<tr>
<td>5</td>
<td>End plate</td>
<td>Aluminum die-casted</td>
<td>Black</td>
</tr>
<tr>
<td>6</td>
<td>Piston</td>
<td>Resin</td>
<td>—</td>
</tr>
<tr>
<td>7</td>
<td>Junction cover</td>
<td>Resin</td>
<td>—</td>
</tr>
<tr>
<td>8</td>
<td>Light cover</td>
<td>Resin</td>
<td>—</td>
</tr>
</tbody>
</table>

Sub-plate Assembly Part No.

- Plug-in: VFS4000-P-
- Non plug-in: VFS4000-S-

Mounting bolt and gasket are not included.

Part no. for mounting bolt and gasket: BG-VFS4000

Replacement Parts

<table>
<thead>
<tr>
<th>No.</th>
<th>Description</th>
<th>Material</th>
<th>Part no.</th>
</tr>
</thead>
<tbody>
<tr>
<td>9</td>
<td>Return spring</td>
<td>Stainless steel</td>
<td>VFS4000-18-1</td>
</tr>
<tr>
<td>10</td>
<td>Gasket</td>
<td>NBR</td>
<td>VFS4000-20-1</td>
</tr>
<tr>
<td>11</td>
<td>Hexagon socket head screw</td>
<td>Steel</td>
<td>M4 x 40</td>
</tr>
<tr>
<td>12</td>
<td>Detent assembly</td>
<td>—</td>
<td>—</td>
</tr>
<tr>
<td>13</td>
<td>Pilot valve assembly</td>
<td>—</td>
<td>VFS4000-12A</td>
</tr>
</tbody>
</table>

Refer to “How to Order Pilot Valve Assembly” on page 3-8-70.
5 Port Pilot Operated Solenoid Valve
Metal Seal, Plug-in/Non Plug-in Series VFS4000

Plug-in 2 position single/double, 3 position closed center/exhaust center/pressure center/double check

2 position single: VFS4100-□F

2 position double: VFS4200-□F

3 position closed center: VFS4300-□F

3 position exhaust center: VFS4400-□F

3 position pressure center: VFS4500-□F

3 position double check: VFS4600-□F

Pilot valve manual override

With light/surge voltage suppressor

Electrical entry

2-ø6.5 mounting hole

Rc 1/8 external pilot port
(Only for external pilot)

2(B), 4(A) port
(P E port)

Bottom ported

G 1/2
Electrical entry
Series VFS4000

Non Plug-in 2 position single/double, 3 position closed center/exhaust center/pressure center/double check

2 position single: VFS4110-□E, VFS4110-□D

2 position double: VFS4210-□E, VFS4210-□D
3 position closed center: VFS4310-□E, VFS4310-□D
3 position exhaust center: VFS4410-□E, VFS4410-□D
3 position pressure center: VFS4510-□E, VFS4510-□D
3 position double check: VFS4610-□E, VFS4610-□D

Applicable cable O.D. ø8 to ø10
G 1/2

Pilot valve manual override
DIN terminal

187 (3 position: 196.5)
2-ø6.5 mounting hole

With direct manual override

108 (E, EZ)
138.5 (D, DZ)
150.5 (D, DZ)

177 (E, EZ)
208.5 (D, DZ)

2-Rc 3/4, 3/4
(Rc, Rc, Rc 3/4)

108 (E, EZ)
220 (D, DZ)

With direct manual override
# SOLENOID VALVES
## SERIES NVFS

**TECHNICAL SPECIFICATIONS**

### Model:

<table>
<thead>
<tr>
<th>Position</th>
<th>Number Of Solenoid</th>
<th>Type</th>
<th>Port Size (NPTF)</th>
<th>Cv Factor</th>
<th>Response Time (ms)</th>
</tr>
</thead>
<tbody>
<tr>
<td>2 Position</td>
<td>Single</td>
<td>NVFS4100</td>
<td>3/8</td>
<td>3.3</td>
<td>40 or less</td>
</tr>
<tr>
<td></td>
<td>Double</td>
<td>NVFS4200</td>
<td>1/2</td>
<td>6</td>
<td>15 or less</td>
</tr>
<tr>
<td></td>
<td>Closed</td>
<td>NVFS4300</td>
<td>3/8</td>
<td>3.3</td>
<td>15 or less</td>
</tr>
<tr>
<td></td>
<td>Exhaust Center</td>
<td>NVFS4400</td>
<td>3/8</td>
<td>2.8</td>
<td>50 or less</td>
</tr>
<tr>
<td></td>
<td>Pressure Center</td>
<td>NVFS4500</td>
<td>3/8</td>
<td>3.2</td>
<td>50 or less</td>
</tr>
<tr>
<td>3 Position</td>
<td>Perfect (Double Check)</td>
<td>NVFS4600</td>
<td>3/8</td>
<td>1.7</td>
<td>55 or less</td>
</tr>
</tbody>
</table>

### Symbols:

- 2 position: Single
- 3 position: Closed center
- Double: Exhaust center
- Pressure center
- Perfect (double check)

**TECHNICAL SPECIFICATIONS (STANDARD)**

- **Fluid**: Air and Inert Gas
- **Max Operating Pressure**: 150 PSI (1MPa)
- **Min Operating Pressure**: 15 PSI (0.1MPa)
- **Ambient & Fluid Temperature**: Note 1) 14~140ºF (-10~60ºC)
- **Lubrication**: Note 2) Not Required
- **Pilot Operator Manual Override**: Non Locking Push Type (Flush)
- **Protection Construction**: Dust Proof
- **Rated Voltage**: AC 110VAC50/60Hz, 220V50/60Hz, 24V50/60Hz
- **Allowable Voltage Range**: -15~10% Rated Voltage
- **Coil Insulation**: Class B or Equivalent
- **Apparent Power AC InRush**: 5.0VA/60Hz, 5.6VA/50Hz
- **Power Consumption**: Holding 2.3VA(1.5W)/60Hz, 3.4VA(2.1W)/50Hz, Power Consumption DC 1.8W
- **Electrical Entry**: Plug In

**TECHNICAL SPECIFICATIONS (OPTIONAL)**

- **Pilot Type**: Manual Override
- **Main Valve**: Direct Manual Override Type
- **External Pilot Type**: Pilot Operator
- **Voltage**: AC 100V50/60Hz, 200V50/60Hz
- **Porting**: Bottom Ported Subplate
- **Option**: Windicator Light & Surge Voltage Suppressor

---

**Notes**:

- Note 1) Use Dry Air at Low Temperature
- Note 2) Use Turbine Oil No 1 (ISO VG32), if lubricated

---

**FOR FURTHER TECHNICAL DETAILS ON THIS PRODUCT, REQUEST CATALOG REFERENCE N233**
**Solenoid Valves**

**Series NVFS**

**How to Order**

**NVFS 4000**

**Position**

1. 2 Position Single
2. 2 Position Double
3. 3 Position Closed Center
4. 3 Position Exhaust Center
5. 3 Position Pressure Center
6. 3 Position Perfect

**Body Type**

0. Plug-in Type

**Manual Option**

0. Standard
1. Std & Direct

**Pilot Operator**

- Internal
- External (Special Order)

**Voltage**

1. 100VAC (Special Order)
2. 200VAC (Special Order)
3. 110VAC
4. 220VAC
5. 24VDC
6. 12VDC
9. Others (Special Order)

**Electrical Entry**

F. Through Base

**Port Size**

- Without Subplate
- 3/8 NPTF
- 1/2 NPTF
- EA, EB: 3/8 NPTF
- Bottom Ported: 3/8 Only

**Porting**

- Side
- *B Bottom

**Manual Override**

- Non Locking Push Type (Flush)
- Non Locking Push Type (Extended)
- Lock Type (Screw Type)
- Lock Type (Lever)

**Options**

- None
- With Indicator Light and Surge Voltage Suppressor

**Port Size**

- 3/8 NPTF
- 1/2 NPTF

**Manual Override**

- Side
- Bottom

**Options**

- None
- With Indicator Light and Surge Voltage Suppressor

**Plug-in Type: With Terminal Block**

- Lead wires of solenoid valve are connected with the terminals on upper surface of terminal block, corresponding lead wires from power source can be wired at the bottom of terminal block.

**NVFS4-O1T-O61-O3T**

**Port Specifications**

- P
- EA, EB
- A, B

**Porting**

- Side
- Bottom

**Port Specifications (A,B)**

- Common
- Mixed

**Note**

* Special order.
**Manifold / Option Parts**

### SUP Relocation spacer

An individual SUP spacer on manifold block can form individual P port for the valve.

<table>
<thead>
<tr>
<th>Body type</th>
<th>Plug-in type</th>
<th>Part No.</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>NVVFS4000-P-03T-1</td>
</tr>
</tbody>
</table>

### EXH Relocation spacer

An individual EXH spacer on manifold block can form individual R port for the valve.

<table>
<thead>
<tr>
<th>Body type</th>
<th>Plug-in type</th>
<th>Part No.</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>NVVFS4000-R-04T-1</td>
</tr>
</tbody>
</table>

### SUP gallery block disc

When supplying manifold with more than one pressure, insert block disc in between stations subjected to different pressures.

<table>
<thead>
<tr>
<th>Body type</th>
<th>Plug-in type</th>
<th>Part No.</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>AXT634-10A</td>
</tr>
</tbody>
</table>

### EXH gallery block disc

When valve exhaust affects the other stations on the circuit or when the reverse pressure valve is used on a standard manifold, insert EXH block disc(s) in between stations to separate valve exhaust.

<table>
<thead>
<tr>
<th>Body type</th>
<th>Plug-in type</th>
<th>Part No.</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>AXT634-11A</td>
</tr>
</tbody>
</table>

### Interface speed control

Needle valve on the manifold block can control cylinder speed by throttling exhaust.

<table>
<thead>
<tr>
<th>Body type</th>
<th>Plug-in type</th>
<th>Part No.</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>NVVFS4000-20A-1</td>
</tr>
</tbody>
</table>

### Double Check “Perfect” spacer

The concurrent use of perfect spacer with built-in double check valve can stop the cylinder at mid-position and hold for extended time without being affected by normal air leakage across the spool seals.

<table>
<thead>
<tr>
<th>Body type</th>
<th>Plug-in type</th>
<th>Part No.</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>NVVFS4000-22A-1</td>
</tr>
</tbody>
</table>

### Interface regulator

Spacer type regulating valve on manifold block can regulate the pressure to the valve. With std. gauge.

<table>
<thead>
<tr>
<th>Body type</th>
<th>Plug-in type</th>
<th>Part No.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Pressure Regulation P</td>
<td>NARBF4000-N0-P-1</td>
<td></td>
</tr>
<tr>
<td>Pressure Regulation A</td>
<td>NARBF4000-N0-A-1</td>
<td></td>
</tr>
<tr>
<td>Pressure Regulation B</td>
<td>NARBF4000-N0-B-1</td>
<td></td>
</tr>
</tbody>
</table>

### Blank plate:VVFS4000-10A

When disassembling valve for maintenance purposes or when spare manifold stations are required, install Blank plate on the manifold block.

<table>
<thead>
<tr>
<th>Body type</th>
<th>Plug-in type</th>
<th>Part No.</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>VVFS4000-10A</td>
</tr>
</tbody>
</table>

**Manifold Options**

### With exhaust cleaner unit

Plug-in type

- Valve exhaust noise damping: 35db or more.
- Oil mist collection: Rate of collection 99.9% or more.
- Piping process reduced.

For more information, refer to catalog N233

### With Control Unit

Plug-in type

- Filter/Regulator, Pressure Switch, and Air shut-off valve all combine to form one unit.
- Piping work eliminated.

For more information, refer to catalog N233