Intrinsically Safe Explosion-proof System

5 Port Solenoid Valve

Can be used as a certified intrinsic safety type product only in Japan.

Exia II BT4 (TIIS approved product)

This product has been certified as an intrinsic safety type system consisting of an electromagnet for a solenoid valve in combination with a safety retainer, for type approval as an explosion proof electric apparatus by Technology Institution of Industrial Safety (TIIS).

Series 51-SY5000/7000/9000
**Compact, High Flow**

<table>
<thead>
<tr>
<th>Dimensions</th>
<th>L1</th>
<th>L2</th>
<th>L3</th>
</tr>
</thead>
<tbody>
<tr>
<td>Model</td>
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<td></td>
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</tr>
<tr>
<td>51-SY5120-L</td>
<td>104</td>
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<tr>
<td>51-SY5120-LL</td>
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<tr>
<td>51-SY7120-TT</td>
<td>165.1</td>
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</table>

**Flow-rate Characteristics**

<table>
<thead>
<tr>
<th>Series</th>
<th>Flow-rate characteristics</th>
<th>1→4/2 (P→A/B)</th>
<th>4/2→5/3 (A/B→EA/EB)</th>
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<tbody>
<tr>
<td></td>
<td></td>
<td>C(dm³/(s·bar))</td>
<td>b</td>
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<td>Body ported</td>
<td></td>
<td></td>
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<tr>
<td>51-SY5□20</td>
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<td>1.9</td>
<td>0.35</td>
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<tr>
<td>51-SY7□20</td>
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<td>0.23</td>
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<tr>
<td>51-SY9□20</td>
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<td>7.0</td>
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<tr>
<td>Base mounted</td>
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<td>51-SY5□40</td>
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<td>51-SY7□40</td>
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<tr>
<td>51-SY9□40</td>
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<td>7.9</td>
<td>0.34</td>
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</tbody>
</table>

**Models**

- 51-SY5120-L
- 51-SY5120-LL
- 51-SY5120-TT
- 51-SY7120-L
- 51-SY7120-LL
- 51-SY7120-TT
- 51-SY9120-L
- 51-SY9120-LL
- 51-SY9120-TT

**Features**

- Compact, High Flow

**Notes**

- Dimensions:
  - L1: 40, 42
  - L2: 104, 120.8, 118.2, 135, 148.3, 165.1
  - L3: 15, 18, 23

- Flow-rate characteristics:
  - Body ported
  - Base mounted

- Flow-rate characteristics table includes values for 1→4/2 (P→A/B) and 4/2→5/3 (A/B→EA/EB) with additional data for compact and high flow models.

- SMC logo and text: Features 1
3 Types of Connectors

- Easily maintained by adapting connector for the lead wire (L- and LL-type)
- IP65 compliant (TT-type)

3 Types of Barriers

- Zener diode type
- Insulating type
Intrinsically Safe Explosion-proof System
5 Port Solenoid Valve
**Series 51-SY5000/7000/9000**
Body Ported
**Single Unit**

### How to Order

**Series**

- 51-SY5000
- 51-SY7000
- 51-SY9000

**Explosion-proof**

Intrinsically safe explosion-proof structure

**Type of actuation**

1. 2-position single
   - Symbol: (A4 2(B))
   - Thread piping: Nil or Rc

2. 2-position double
   - Symbol: (A4 2(B))
   - Thread piping: Nil or Rc

3. 3-position closed center
   - Symbol: (A4 2(B))
   - Thread piping: Nil or Rc

4. 3-position exhaust center
   - Symbol: (A4 2(B))
   - Thread piping: Nil or Rc

5. 3-position pressure center
   - Symbol: (A4 2(B))
   - Thread piping: Nil or Rc

**Thread type**

- Nil: Without bracket
- F1: With foot bracket
- F2: With side bracket
- Note) 3-position type is not available for the 51-SY9000 series.

**A, B port size**

- Symbol: (EA5 1(B))
- Applicable series: 51-SY5000/7000/9000

**Thread piping**

- Symbol: Port size
- Applicable series:
  - 01: 1/8
  - 02: 1/4
  - 03: 3/8

**One-touch fitting (Metric size)**

- Symbol: Port size
- Applicable series:
  - C4: ø4 one-touch fitting
  - C6: ø6 one-touch fitting
  - C8: ø8 one-touch fitting
  - C10: ø10 one-touch fitting
  - C12: ø12 one-touch fitting

**Manual override**

- Nil: Non-locking push type
- D: Push-turn locking slotted type
- E: Push-turn locking lever type

**Electrical entry**

- Symbol: Electrical entry
- L: L-type plug connector
- LL: L-type plug connector with cover
- TT: Ground nut (Note)

**Lead wire length**

- Symbol: Lead wire length
- Note:
  - 3: 300 mm
  - 6: 600 mm (Maximum length for L-type)
  - 10: 1000 mm
  - 15: 1500 mm
  - 20: 2000 mm
  - 30: 3000 mm
  - 100: 10000 mm (Semi-standard)

**System**

- A: Z728.H (51-SYE100-A)
- B: MTL728P + (51-SYE100-B)
- F: KFD0-SD2-Ext.1065 (51-SYE100-F)

Note 1) Attached barrier type
The numbers in ( ), 51-SYE100- represents SMC’s control number.

Note 2) If the barrier is not necessary due to valve replacement etc, enter O after the system symbol.
Example) 51-SY5120-AOLL3-01

**Warning**

If a resin tube is used, take measures against static electricity.

Note) TT-type is connected to the terminal block.
Cables other than the connected one cannot be used.

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Cables other than the connected one cannot be used.

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© 1

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Note) TT-type is connected to the terminal block.
Cables other than the connected one cannot be used.
Body Ported Series 51-SY5000/7000/9000

Specifications

<table>
<thead>
<tr>
<th>Series</th>
<th>Fluid</th>
<th>Internal pilot operating pressure range (MPa)</th>
<th>Ambient and fluid temperature (°C)</th>
<th>Max. operating frequency (Hz)</th>
<th>Manual override (Manual operation)</th>
<th>Pilot exhaust method</th>
<th>Lubrication</th>
<th>Mounting orientation</th>
<th>Impact/Vibration resistance (m/s²)</th>
<th>Enclosure</th>
</tr>
</thead>
<tbody>
<tr>
<td>51-SY5000</td>
<td>Air</td>
<td>2-position single: 0.15 to 0.7</td>
<td>–10 to 50 (No freezing)</td>
<td>2-position single: 5</td>
<td>Non-locking push type, Push-turn locking slotted type, Push-turn locking lever type</td>
<td>Main/Pilot valve common exhaust</td>
<td>Not required</td>
<td>Unrestricted</td>
<td>150/30</td>
<td>IP30 (L-type), IP40 (LL-type), IP65 (TT-type)</td>
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<tr>
<td>51-SY7000</td>
<td>2-position double: 0.1 to 0.7</td>
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<td></td>
<td>5-position: 3</td>
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</tr>
<tr>
<td>51-SY9000</td>
<td>3-position: 0.2 to 0.7</td>
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Note) Based on dynamic performance test, JIS B8419: 2010. (Coil temperature: 20 °C, system A, B, F at 24 VDC)

Solenoid Specifications

<table>
<thead>
<tr>
<th>Type of actuation</th>
<th>51-SY5000</th>
<th>51-SY7000</th>
<th>51-SY9000</th>
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</thead>
<tbody>
<tr>
<td>2-position single</td>
<td>26 or less</td>
<td>38 or less</td>
<td>50 or less</td>
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<tr>
<td>2-position double</td>
<td>22 or less</td>
<td>30 or less</td>
<td>50 or less</td>
</tr>
<tr>
<td>3-position</td>
<td>38 or less</td>
<td>56 or less</td>
<td>—</td>
</tr>
</tbody>
</table>

Intrinsically Safe Explosion-proof System Specifications

- Type of explosion-proof structure: Intrinsically safe explosion-proof structure (ia) Note 1)
- Applicable gas or ignition temperature of steam and explosion class: II BT4
- Voltage to barrier: 24 VDC (rated voltage of system) Note 2) Note 3)
- Tolerant voltage fluctuation: Refer to the barrier dimensions on page 41 and 42.

Note 1) Warning: Can not be used in a class-0 environment. Use in a class-2 or class-1 environment.
Note 2) Caution: The valve and barrier have polarity. If voltage is supplied with wrong polarity, the barrier can not be used.
Note 3) Caution: Voltage to the valve should be 10.8 VDC (minimum value).

Response Time

(2-position single: 26 or less, 51-SY5000; 38 or less, 51-SY7000; 56 or less, 51-SY9000)

Note) Based on dynamic performance test, JIS B8419: 2010. (Coil temperature: 20 °C, system A, B, F at 24 VDC)
### Series 51-SY5000/7000/9000

#### Flow-rate Characteristics

<table>
<thead>
<tr>
<th>Series 51-SY5000</th>
<th>Valve model</th>
<th>Type of actuation</th>
<th>Port size</th>
<th>1, 5, 3</th>
<th>4, 2  (A, B)</th>
<th>Flow-rate characteristics</th>
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<tbody>
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<td></td>
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<td>1/8</td>
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<td>51-SYS -01</td>
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<td>1.9</td>
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<tr>
<td></td>
<td></td>
<td>Double</td>
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<td>1.5</td>
<td>2.2</td>
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<td></td>
<td>3-position</td>
<td>Closed center</td>
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<td>1.7</td>
<td>2.0</td>
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<tr>
<td></td>
<td></td>
<td>Exhaust center</td>
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<td>1.5</td>
<td>2.2</td>
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<td></td>
<td></td>
<td>Pressure center</td>
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<th>Valve model</th>
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<th>Port size</th>
<th>1, 5, 3</th>
<th>4, 2 (A, B)</th>
<th>Flow-rate characteristics</th>
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</thead>
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</tr>
<tr>
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<td>3-position</td>
<td>Closed center</td>
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<td>Exhaust center</td>
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</table>

Note) [ ]: Normal position

### Series 51-SY9000

<table>
<thead>
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<th>Series 51-SY9000</th>
<th>Valve model</th>
<th>Type of actuation</th>
<th>Port size</th>
<th>1, 5, 3</th>
<th>4, 2 (A, B)</th>
<th>Flow-rate characteristics</th>
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Note) [ ]: Normal position

### Series 51-SY7000

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<td>Exhaust center</td>
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</tbody>
</table>

Note) [ ]: Normal position
**Body Ported Series 51-SY5000/7000/9000**

**Construction**

**Series SY**

### 2-position single

Symbol

2-position single

(1) A

(2) B

(3) (EA)

(4) (P)

(5) (EB)

### 2-position double

Symbol

2-position double

(1) A

(2) B

(3) (EA)

(4) (P)

(5) (EB)

### 3-position closed center/exhaust center/pressure center

Symbol

3-position closed center

(1) A

(2) B

(3) (EA)

(4) (P)

(5) (EB)

(This figure shows a closed center type.)

---

**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>White</td>
</tr>
<tr>
<td>2</td>
<td>Adapter plate</td>
<td>Resin</td>
<td>White (51-SY9000: Gray)</td>
</tr>
<tr>
<td>3</td>
<td>End plate</td>
<td>Resin</td>
<td>White</td>
</tr>
<tr>
<td>4</td>
<td>Piston</td>
<td>Resin</td>
<td>—</td>
</tr>
<tr>
<td>5</td>
<td>Spool valve assembly</td>
<td>Aluminum, HNBR</td>
<td>—</td>
</tr>
</tbody>
</table>

**Replacement Parts**

<table>
<thead>
<tr>
<th>No.</th>
<th>Description</th>
<th>Part no.</th>
</tr>
</thead>
<tbody>
<tr>
<td>6</td>
<td>Port block assembly</td>
<td>Refer to &quot;How to Order Port Block Assembly&quot; on page 5.</td>
</tr>
</tbody>
</table>

**Bracket Assembly Part No.**

<table>
<thead>
<tr>
<th>Description</th>
<th>Part no.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Bracket (for F1)</td>
<td>SX000-16-2A (with mounting screw)</td>
</tr>
<tr>
<td>Bracket (for F2)</td>
<td>SX000-16-1A (with mounting screw)</td>
</tr>
</tbody>
</table>

* The 51-SY9000 has no bracket.

---

**How to Change Port Block Assembly**

If using body ported type, both A and B port sizes can be changed by replacing the port block assembly mounted on the body. When changing this block assembly, the correct screw torque must be achieved to avoid possible air leakage.

- **51-SY5000**
  - Port block assembly
    - (Threaded type)

---

**Caution**

*Mounting screw tightening torques*

- 51-SY5000 (M3): 0.6 N·m
- 51-SY9000 (M4): 1.4 N·m

Refer to "How to Order Port Block Assembly" on page 5 for part number.
How to Order Port Block Assembly

**SY** [□□□□ - 6A - □□□□]

- **Series**
  - 5 51-SY5000
  - 7 51-SY7000
  - 9 51-SY9000

- **Thread type**
  - Nil
  - Rc
  - F
  - G
  - N
  - NPT
  - T
  - NPTF

- **A, B port size**

<table>
<thead>
<tr>
<th>Symbol</th>
<th>Port size</th>
<th>Applicable series</th>
</tr>
</thead>
<tbody>
<tr>
<td>01</td>
<td>1/8</td>
<td>51-SY5000</td>
</tr>
<tr>
<td>02</td>
<td>1/4</td>
<td>51-SY7000</td>
</tr>
<tr>
<td>02</td>
<td>1/4</td>
<td>51-SY9000</td>
</tr>
<tr>
<td>03</td>
<td>3/8</td>
<td></td>
</tr>
</tbody>
</table>

- **Thread piping**

<table>
<thead>
<tr>
<th>Symbol</th>
<th>Port size</th>
<th>Applicable series</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>51-SY5000</td>
</tr>
<tr>
<td></td>
<td></td>
<td>51-SY7000</td>
</tr>
<tr>
<td></td>
<td></td>
<td>51-SY9000</td>
</tr>
</tbody>
</table>

- **One-touch fitting (Metric size)**

<table>
<thead>
<tr>
<th>Symbol</th>
<th>Port size</th>
<th>Applicable series</th>
</tr>
</thead>
<tbody>
<tr>
<td>C4</td>
<td>ø4 one-touch fitting</td>
<td>51-SY5000</td>
</tr>
<tr>
<td>C6</td>
<td>ø6 one-touch fitting</td>
<td></td>
</tr>
<tr>
<td>C8</td>
<td>ø8 one-touch fitting</td>
<td></td>
</tr>
<tr>
<td>C8</td>
<td>ø8 one-touch fitting</td>
<td>51-SY7000</td>
</tr>
<tr>
<td>C10</td>
<td>ø10 one-touch fitting</td>
<td>51-SY9000</td>
</tr>
<tr>
<td>C8</td>
<td>ø8 one-touch fitting</td>
<td></td>
</tr>
<tr>
<td>C12</td>
<td>ø12 one-touch fitting</td>
<td></td>
</tr>
</tbody>
</table>

- **One-touch fitting (Inch size)**

<table>
<thead>
<tr>
<th>Symbol</th>
<th>Port size</th>
<th>Applicable series</th>
</tr>
</thead>
<tbody>
<tr>
<td>N3</td>
<td>ø5/32” one-touch fitting</td>
<td>51-SY5000</td>
</tr>
<tr>
<td>N7</td>
<td>ø1/4” one-touch fitting</td>
<td></td>
</tr>
<tr>
<td>N9</td>
<td>ø5/16” one-touch fitting</td>
<td></td>
</tr>
<tr>
<td>N9</td>
<td>ø5/16” one-touch fitting</td>
<td>51-SY7000</td>
</tr>
<tr>
<td>N9</td>
<td>ø5/16” one-touch fitting</td>
<td>51-SY9000</td>
</tr>
<tr>
<td>N11</td>
<td>ø3/8” one-touch fitting</td>
<td></td>
</tr>
<tr>
<td>N11</td>
<td>ø3/8” one-touch fitting</td>
<td></td>
</tr>
</tbody>
</table>

- **Symbol Port size**

| 51-SY5000 | ø4 one-touch fitting | VVQ1000-51A-C4 |
| 51-SY5000 | ø6 one-touch fitting | VVQ1000-51A-C6 |
| 51-SY5000 | ø8 one-touch fitting | VVQ1000-51A-C8 |
| 51-SY7000 | ø8 one-touch fitting | VVQ2000-51A-C8 |
| 51-SY9000 | ø10 one-touch fitting| VVQ4000-50B-C8 |
| 51-SY9000 | ø10 one-touch fitting| VVQ4000-50B-C10 |
| 51-SY9000 | ø12 one-touch fitting| VVQ4000-50B-C12 |

- **Inch size**

| 51-SY5000 | ø5/32” one-touch fitting | VVQ1000-51A-N3 |
| 51-SY5000 | ø1/4” one-touch fitting  | VVQ1000-51A-N7 |
| 51-SY5000 | ø5/16” one-touch fitting | VVQ1000-51A-N9 |
| 51-SY7000 | ø5/16” one-touch fitting | VVQ2000-51A-N9 |
| 51-SY9000 | ø3/8” one-touch fitting  | VVQ4000-50B-N9 |
| 51-SY9000 | ø3/8” one-touch fitting  | VVQ4000-50B-N11 |

- **Warning**

If a resin tube is used, take measures against static electricity.
Dimensions: 51-SY5000

2-position single
L-type plug connector (L)
51-SY5120-□□-01□ (-F2)

With foot bracket
51-SY5120-□□-01□-F1

L-type plug connector with cover (LL)
51-SY5120-□□-01□ (-F2)

With IP65 compliant cable (TT)
51-SY5120-□□-01□ (-F2)

Body Ported Series 51-SY5000/7000/9000

Insulator: Red (+)
Insulator: Black (-)

0.3 mm²

Lead wire marking
No.1 (+), No.2 (–)

0.75 mm²

Max. 10
Series 51-SY5000/7000/9000

Dimensions: 51-SY5000

2-position double
L-type plug connector (L)
51-SY5220-□L□□-01□ (-F2)

L-type plug connector with cover (LL)
51-SY5220-□LL□□-01□ (-F2)

With IP65 compliant cable (TT)
51-SY5220-□TT□□-01□ (-F2)
Dimensions: 51-SY5000

3-position closed center/exhaust center/pressure center
L-type plug connector (L)
51-SY5\(\frac{2}{5}\)20□□□-01□ (-F2)

L-type plug connector with cover (LL)
51-SY5\(\frac{2}{5}\)20□□□-01□ (-F2)

With IP65 compliant cable (TT)
51-SY5\(\frac{2}{5}\)20□□□-01□ (-F2)
Series 51-SY5000/7000/9000

Dimensions: 51-SY7000

2-position single
L-type plug connector (L)
51-SY7120-□□□-□□□ □(-F2)

With foot bracket
51-SY7120-□□□-□□□ □(-F1)

L-type plug connector with cover (LL)
51-SY7120-□□□-□□□ □(-F2)

With IP65 compliant cable (TT)
51-SY7120-□□□-□□□ □(-F2)

Insulator: Red (+)  Insulator: Black (-)

0.3 mm²

2 x ø2.2
(For manifold gasket positioning)

2 x ø4.2
(manifold mounting hole)

2 x M4 x 0.7 thread depth 6.5
(For mounting bracket)

57
46
5.5

40
125

14.7
28
38

L (Lead wire length)

123.3
(39.4)

44 (E-type)

79.2
13.6

20
42

Insulator: Black (-)

Manual override

2 x ø4.2
(2 x ø4.2 mounting hole)

4
10

8
18

2 x 1/4"
(A(4), B(2) port)

2 x 1/8"
(EA(5), EB(3) port)

42 (66)
66 (66)

24.5
40
(42.5)
(66.5)

L (Lead wire length)

118.2

2

5.5

20

2 x M6 x 0.7 thread depth 4.2
(For manifold gasket positioning)

0.75 mm²

Max. 10

0.75 mm²

L (Lead wire length)

29.4
Dimensions: 51-SY7000

2-position double
L-type plug connector (L)
51-SY7220-[L][-02] (-F2)

L-type plug connector with cover (LL)
51-SY7220-[LL][-02] (-F2)

With IP65 compliant cable (TT)
51-SY7220-[TT][-02] (-F2)

Body Ported Series 51-SY5000/7000/9000
Dimensions: 51-SY7000

3-position closed center/exhaust center/pressure center
L-type plug connector (L)
51-SY7  
20-□□□□-02□ (-F2)

L-type plug connector with cover (LL)
51-SY7  
20-□□□□-02□ (-F2)

With IP65 compliant cable (TT)
51-SY7  
20-□□□□-02□ (-F2)
Body Ported Series 51-SY5000/7000/9000

Dimensions: 51-SY9000

2-position single
L-type plug connector (L)
51-SY9120-[L□□□]0□ 0□

Insulator: Black (-)
Insulator: Red (+)
Manual override

2 x ø4.4
(Mounting hole)

3 x ø3.2
(manifold mounting hole)

3 x 1/4”, 3/8”
(4(A), 2(B) port)

L (Lead wire length)

L-type plug connector with cover (LL)
51-SY9120-[LL□□□]0□ 0□

Insulator: Red (+)
Insulator: Black (-)

0.3 mm²

L (Lead wire length)

With IP65 compliant cable (TT)
51-SY9120-[TT□□□]0□ 0□

Lead wire marking
No.1 (+), No.2 (-)

0.75 mm²

L (Lead wire length)

Max. 10

12
Series 51-SY5000/7000/9000

Dimensions: 51-SY9000

2-position double
L-type plug connector (L)
51-SY9220-□□□-□□□

L-type plug connector with cover (LL)
51-SY9220-□□□-□□□-□□□

With IP65 compliant cable (TT)
51-SY9220-□□□-□□□-□□□
Intrinsically Safe Explosion-proof System

**5 Port Solenoid Valve**

**Single Unit**

### How to Order

**51-SY**  

**Series**  

<table>
<thead>
<tr>
<th>Symbol</th>
<th>Port size</th>
<th>Applicable series</th>
</tr>
</thead>
<tbody>
<tr>
<td>Nil</td>
<td>Without sub-plate</td>
<td>51-SY5000</td>
</tr>
<tr>
<td>02</td>
<td>1/4</td>
<td>51-SY5000</td>
</tr>
<tr>
<td></td>
<td>With sub-plate</td>
<td>51-SY7000</td>
</tr>
<tr>
<td>03</td>
<td>3/8</td>
<td>51-SY7000</td>
</tr>
<tr>
<td></td>
<td>With sub-plate</td>
<td>51-SY9000</td>
</tr>
<tr>
<td>04</td>
<td>1/2</td>
<td>51-SY9000</td>
</tr>
</tbody>
</table>

### Pilot type

- Nil: Internal pilot
- R: External pilot

### Lead wire length

<table>
<thead>
<tr>
<th>Symbol</th>
<th>Lead wire length</th>
<th>Note</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>300 mm</td>
<td>—</td>
</tr>
<tr>
<td>6</td>
<td>600 mm</td>
<td>Maximum length for L-type</td>
</tr>
<tr>
<td>10</td>
<td>1000 mm</td>
<td>—</td>
</tr>
<tr>
<td>15</td>
<td>1500 mm</td>
<td>—</td>
</tr>
<tr>
<td>20</td>
<td>2000 mm</td>
<td>—</td>
</tr>
<tr>
<td>30</td>
<td>3000 mm</td>
<td>—</td>
</tr>
<tr>
<td>100</td>
<td>10000 mm</td>
<td>Semi-standard</td>
</tr>
</tbody>
</table>

### Electrical entry

- **Symbol**: L
  - L-type plug connector

- **Symbol**: LL
  - L-type plug connector with cover

- **Symbol**: TT
  - Ground nut

**System** (Note 1) (Note 2)

- A: Z728.H (51-SYE100-A)
- B: MTL728P + (51-SYE100-B)
- F: KFD0-SD2-Ex1.1065 (51-SYE100-F)

**Note 1**: Attached barrier type
- The numbers in ( ) represent SMC’s control number.

**Note 2**:
- If the barrier is not necessary due to valve replacement etc., enter O after the system symbol. Example: 51-SY5140-AOLL3

**Thread type**

- Nil: Rc
  - F: G
  - N: NPT
  - T: NPTF

**Thread type**

- Nil: Rc
  - F: G
  - N: NPT
  - T: NPTF

**Manual override**

- Nil: Non-locking push type
- D: Push-turn locking slotted type
- E: Push-turn locking lever type

**Note** TT-type is connected to the terminal block.
- Cables other than the connected one cannot be used.
## Specifications

<table>
<thead>
<tr>
<th></th>
<th>51-SY5000</th>
<th>51-SY7000</th>
<th>51-SY9000</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Fluid</strong></td>
<td>Air</td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Internal pilot</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>operating pressure</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>range (MPa)</td>
<td>0.15 to 0.7</td>
<td>0.1 to 0.7</td>
<td>0.2 to 0.7</td>
</tr>
<tr>
<td><strong>External pilot</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>operating pressure</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>range (MPa)</td>
<td>0.1 to 0.7</td>
<td>0.15 to 0.7</td>
<td>0.25 to 0.7</td>
</tr>
<tr>
<td><strong>Ambient and fluid</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>temperature (°C)</td>
<td>–100 kPa to 0.7</td>
<td>0.25 to 0.7</td>
<td>0.25 to 0.7</td>
</tr>
<tr>
<td><strong>Max. operating</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>frequency (Hz)</td>
<td>2-position single, double</td>
<td>5</td>
<td>3</td>
</tr>
<tr>
<td><strong>Manual override</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>(Manual operation)</td>
<td>Non-locking push type, Push-turn locking slotted type, Push-turn locking lever type</td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Pilot exhaust method</strong></td>
<td>Internal pilot</td>
<td>Main/Pilot valve common exhaust</td>
<td>Pilot valve individual exhaust</td>
</tr>
<tr>
<td></td>
<td>External pilot</td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Lubrication</strong></td>
<td>Not required</td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Mounting orientation</strong></td>
<td>Unrestricted</td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Impact/Vibration resistance (m/s²)</strong></td>
<td>150/30</td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Enclosure</strong></td>
<td>IP30 (L-type), IP40 (LL-type), IP65 (TT-type)</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

- Based on IEC60529

**Note:** Impact resistance: No malfunction occurred when it is tested 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)

## Solenoid Specifications

<table>
<thead>
<tr>
<th></th>
<th>L-type plug connector (L), L-type plug connector with cover (LL), Terminal type (TT)</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Coil rated voltage</strong></td>
<td>12 VDC</td>
</tr>
<tr>
<td><strong>Allowable voltage fluctuation</strong></td>
<td>–10% to +10% of rated voltage</td>
</tr>
<tr>
<td><strong>Coil insulation type</strong></td>
<td>Class B</td>
</tr>
<tr>
<td><strong>Power consumption</strong></td>
<td>0.52 W (at rated voltage)</td>
</tr>
</tbody>
</table>

## Intrinsically Safe Explosion-proof System Specifications

<table>
<thead>
<tr>
<th><strong>Type of explosion-proof structure</strong></th>
<th>Intrinsically safe explosion-proof structure [(a)] Note 1)</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Applicable gas or ignition</strong></td>
<td>IIBT4</td>
</tr>
<tr>
<td>temperature of steam and explosion</td>
<td></td>
</tr>
<tr>
<td>class</td>
<td></td>
</tr>
<tr>
<td><strong>Voltage to barrier</strong></td>
<td>24 VDC (rated voltage of system) Note 2) Note 3)</td>
</tr>
<tr>
<td><strong>Tolerant voltage fluctuation</strong></td>
<td>Refer to the barrier dimensions on page 41 and 42</td>
</tr>
</tbody>
</table>

**Note 1):** Warning Can not be used in a class-0 environment. Use in a class-2 or class-1 environment.

**Note 2):** Caution The valve and barrier have polarity. If voltage is supplied with wrong polarity, the barrier can not be used.

**Note 3):** Caution Voltage to the valve should be 10.8 VDC (minimum value).

## Response Time

<table>
<thead>
<tr>
<th><strong>Type of actuation</strong></th>
<th>51-SY5000</th>
<th>51-SY7000</th>
<th>51-SY9000</th>
</tr>
</thead>
<tbody>
<tr>
<td>2-position single</td>
<td>26 or less</td>
<td>38 or less</td>
<td>50 or less</td>
</tr>
<tr>
<td>2-position double</td>
<td>22 or less</td>
<td>30 or less</td>
<td>50 or less</td>
</tr>
<tr>
<td>3-position</td>
<td>38 or less</td>
<td>56 or less</td>
<td>—</td>
</tr>
</tbody>
</table>
## Flow-rate Characteristics

### Series 51-SY5000

<table>
<thead>
<tr>
<th>Valve model</th>
<th>Type of actuation</th>
<th>Port size</th>
<th>1→4/2 (P→A/B)</th>
<th>Flow-rate characteristics ((\text{m}^3/(s\cdot\text{bar})))</th>
<th>4/2→5/3 (A/B→EA/EB)</th>
<th>Flow-rate characteristics ((\text{m}^3/(s\cdot\text{bar})))</th>
</tr>
</thead>
<tbody>
<tr>
<td>51-SY5000</td>
<td>2-position</td>
<td>1/4</td>
<td></td>
<td>b</td>
<td>Cv</td>
<td>b</td>
</tr>
<tr>
<td></td>
<td>Single</td>
<td></td>
<td>2.4</td>
<td>0.41</td>
<td>0.64</td>
<td>2.8</td>
</tr>
<tr>
<td></td>
<td>Double</td>
<td></td>
<td>1.8</td>
<td>0.47</td>
<td>0.50</td>
<td>1.8</td>
</tr>
<tr>
<td></td>
<td>Closed center</td>
<td></td>
<td>1.4</td>
<td>0.55</td>
<td>0.44</td>
<td>3.0</td>
</tr>
<tr>
<td></td>
<td>Exhaust center</td>
<td></td>
<td>3.3</td>
<td>0.36</td>
<td>0.85</td>
<td>1.8</td>
</tr>
<tr>
<td></td>
<td>Pressure center</td>
<td></td>
<td>0.84</td>
<td>[0.60]</td>
<td>0.28</td>
<td>1.1</td>
</tr>
</tbody>
</table>

**Note:** [ ]: Normal position

### Series 51-SY7000

<table>
<thead>
<tr>
<th>Valve model</th>
<th>Type of actuation</th>
<th>Port size</th>
<th>1→4/2 (P→A/B)</th>
<th>Flow-rate characteristics ((\text{m}^3/(s\cdot\text{bar})))</th>
<th>4/2→5/3 (A/B→EA/EB)</th>
<th>Flow-rate characteristics ((\text{m}^3/(s\cdot\text{bar})))</th>
</tr>
</thead>
<tbody>
<tr>
<td>51-SY7000</td>
<td>2-position</td>
<td>1/4</td>
<td></td>
<td>b</td>
<td>Cv</td>
<td>b</td>
</tr>
<tr>
<td></td>
<td>Single</td>
<td></td>
<td>4.1</td>
<td>0.41</td>
<td>1.1</td>
<td>4.1</td>
</tr>
<tr>
<td></td>
<td>Double</td>
<td></td>
<td>3.0</td>
<td>0.43</td>
<td>0.80</td>
<td>2.6</td>
</tr>
<tr>
<td></td>
<td>Closed center</td>
<td></td>
<td>2.6</td>
<td>0.42</td>
<td>0.71</td>
<td>4.7</td>
</tr>
<tr>
<td></td>
<td>Exhaust center</td>
<td></td>
<td>5.3</td>
<td>[2.3]</td>
<td>0.39</td>
<td>1.3</td>
</tr>
<tr>
<td></td>
<td>Pressure center</td>
<td></td>
<td>0.84</td>
<td>[0.49]</td>
<td>0.36</td>
<td>0.48</td>
</tr>
<tr>
<td></td>
<td></td>
<td>3/8</td>
<td>3.3</td>
<td>[2.3]</td>
<td>0.48</td>
<td>0.36</td>
</tr>
</tbody>
</table>

**Note:** [ ]: Normal position

### Series 51-SY9000

<table>
<thead>
<tr>
<th>Valve model</th>
<th>Type of actuation</th>
<th>Port size</th>
<th>1→4/2 (P→A/B)</th>
<th>Flow-rate characteristics ((\text{m}^3/(s\cdot\text{bar})))</th>
<th>4/2→5/3 (A/B→EA/EB)</th>
<th>Flow-rate characteristics ((\text{m}^3/(s\cdot\text{bar})))</th>
</tr>
</thead>
<tbody>
<tr>
<td>51-SY9000</td>
<td>2-position</td>
<td>3/8</td>
<td></td>
<td>b</td>
<td>Cv</td>
<td>b</td>
</tr>
<tr>
<td></td>
<td>Single</td>
<td></td>
<td>7.9</td>
<td>0.34</td>
<td>2.0</td>
<td>9.6</td>
</tr>
<tr>
<td></td>
<td>Double</td>
<td></td>
<td>8.0</td>
<td>0.48</td>
<td>2.2</td>
<td>10</td>
</tr>
<tr>
<td></td>
<td>Single</td>
<td></td>
<td>8.0</td>
<td>0.48</td>
<td>2.2</td>
<td>10</td>
</tr>
<tr>
<td></td>
<td>Double</td>
<td></td>
<td>8.0</td>
<td>0.48</td>
<td>2.2</td>
<td>10</td>
</tr>
</tbody>
</table>
Series 51-SY5000/7000/9000

Construction

Series SY

Symbol

2-position single

2-position double

3-position closed center

3-position exhaust center

3-position 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>White</td>
</tr>
<tr>
<td>2</td>
<td>Adapter plate</td>
<td>Resin</td>
<td>White (51-SY9000: Gray)</td>
</tr>
<tr>
<td>3</td>
<td>End plate</td>
<td>Resin</td>
<td>White</td>
</tr>
<tr>
<td>4</td>
<td>Piston</td>
<td>Resin</td>
<td>—</td>
</tr>
<tr>
<td>5</td>
<td>Spool valve assembly</td>
<td>Aluminum, HNBR</td>
<td>—</td>
</tr>
</tbody>
</table>

Replacement Parts

<table>
<thead>
<tr>
<th>No.</th>
<th>Description</th>
<th>Part no.</th>
<th>Note</th>
</tr>
</thead>
<tbody>
<tr>
<td>6</td>
<td>Sub-plate</td>
<td>SY5000-27-1</td>
<td>1/4: SY7000-27-1</td>
</tr>
<tr>
<td></td>
<td></td>
<td>1/2: SY9000-27-2</td>
<td>1/2: SY9000-27-2</td>
</tr>
<tr>
<td></td>
<td>Gasket</td>
<td>SY5000-11-15</td>
<td>SY7000-11-11</td>
</tr>
<tr>
<td></td>
<td></td>
<td>SY9000-11-2</td>
<td>SY9000-11-2</td>
</tr>
<tr>
<td></td>
<td>Round head combination screw</td>
<td>M3 x 26</td>
<td>M4 x 31</td>
</tr>
<tr>
<td></td>
<td></td>
<td>SY9000-18-2</td>
<td>For valve mounting</td>
</tr>
<tr>
<td></td>
<td></td>
<td>(M3 x 42)</td>
<td>(Flat nickel plated)</td>
</tr>
</tbody>
</table>

Caution

Mounting screw tightening torques
M3: 0.8 N-m
M4: 1.4 N-m

* Thread type
Dimensions: 51-SY5000

2-position single
L-type plug connector (L)
51-SY5140(R)-L□□-02□

L-type plug connector with cover (LL)
51-SY5140(R)-LL□□-02□

With IP65 compliant cable (TT)
51-SY5140(R)-TT□□-02□
Series 51-SY5000/7000/9000

Dimensions: 51-SY5000

2-position double
L-type plug connector (L)
51-SY5240(R)-□□□□-02□

L-type plug connector with cover (LL)
51-SY5240(R)-□□□□-02□

With IP65 compliant cable (TT)
51-SY5240(R)-□□□□-02□
Dimensions: 51-SY5000

3-position closed center/exhaust center/pressure center
L-type plug connector (L)
51-SY5\(\frac{\sqrt{3}}{5}\)40(R)-□L□□-02□

L-type plug connector with cover (LL)
51-SY5\(\frac{\sqrt{3}}{5}\)40(R)-□LL□□-02□

With IP65 compliant cable (TT)
51-SY5\(\frac{\sqrt{3}}{5}\)40(R)-□TT□□-02□
Dimensions: 51-SY7000

2-position single
L-type plug connector (L)
51-SY7140(R)-□□□-□□□

L-type plug connector with cover (LL)
51-SY7140(R)-□□□-□□□

With IP65 compliant cable (TT)
51-SY7140(R)-□□□-□□□

*SMC*
Dimensions: 51-SY7000

2-position double
L-type plug connector (L)
51-SY7240(R)-\(\mathbb{L}\)\(\mathbb{L}\)\(\mathbb{L}\)

L-type plug connector with cover (LL)
51-SY7240(R)-\(\mathbb{LL}\)\(\mathbb{L}\)\(\mathbb{L}\)

With IP65 compliant cable (TT)
51-SY7240(R)-\(\mathbb{TT}\)\(\mathbb{L}\)\(\mathbb{L}\)
Series 51-SY5000/7000/9000

Dimensions: 51-SY7000

3-position closed center/exhaust center/pressure center
L-type plug connector (L)
51-SY7\textfrac{3}{5}40(R)-LL□□□□

L-type plug connector with cover (LL)
51-SY7\textfrac{3}{5}40(R)-LL□□□□

With IP65 compliant cable (TT)
51-SY7\textfrac{3}{5}40(R)-TT□□□□
Dimensions: 51-SY9000

2-position single
L-type plug connector (L)
51-SY9140-□□□-□□□

L-type plug connector with cover (LL)
51-SY9140-□□□-□□□

With IP65 compliant cable (TT)
51-SY9140-□□□-□□□
Series 51-SY5000/7000/9000

Dimensions: 51-SY9000

2-position double L-type plug connector (L)
51-SY9240-□L□□-□□□

L-type plug connector with cover (LL)
51-SY9240-□LL□□-□□□

With IP65 compliant cable (TT)
51-SY9240-□TT□□-□□□
Intrinsically Safe Explosion-proof System
5 Port Solenoid Valve
Series 51-SY5000/7000
Body Ported Manifold
Bar Stock Type

How to Order Manifold

51-SS5Y 5-20-05

Explosion-proof
Intrinsically safe explosion-proof structure

Manifold series
5 51-SY5000
7 51-SY7000

Stations
02 2 stations
20 20 stations

Thread type
Nil Rc
00F G
00N NPT
00T NPTF

How to Order Valve Manifold Assembly

Example
Double solenoid
51-SY5220-ALL3-01 (2 sets)
51-SY5120-ALL3-01 (2 sets)
Blanking plate assembly
SY5000-26-20A (1 set)
Manifold base (5 stations)
51-SS5Y5-20-05

Cylinder port size
01: 1/8"

The asterisk denotes the symbol for assembly.
Prefix it to the part nos. of the solenoid valve, etc.

Add the valve and option part number under the manifold base part number.
In the case of complex arrangement, specify them on the manifold specification sheet.

* This also includes the number of blanking plate assemblies.

51-SY5000-26-20A 1 set (Blanking plate assembly part no.)
51-SY5120-ALL3-01 2 sets (Single solenoid part no., barrier is attached)
51-SY5220-ALL3-01 2 sets (Double solenoid part no., barrier is attached)
How to Order Valve

**Explosion-proof**

- 51-SY5000
- 51-SY7000

**Type of actuation**

- 1: 2-position single
- 2: 2-position double
- 3: 3-position closed center
- 4: 3-position exhaust center
- 5: 3-position pressure center

**System**

- A: Z728.H (51-SYE100-A)
- B: MTL728P + (51-SYE100-B)
- F: KFD0-SD2-Ex1.1065 (51-SYE100-F)

**Note 1)** Attached barrier type
The numbers in (), 51-SYE100-□, represents SMC’s control number.

**Note 2)** If the barrier is not necessary due to valve replacement etc, enter O after the system symbol.
Example) 51-SY5120-AOLL3-01

**Electrical entry**

- L: L-type plug connector
- LL: L-type plug connector with cover
- TT (Note): With IP65 compliant cable
- Ground nut

**Thread type**

- Nil
- Rc
- F
- G
- N
- NPT
- T
- NPTF

**A, B port size**

- threaded piping
- 01: 1/8
- 02: 1/4

**Thread piping**

<table>
<thead>
<tr>
<th>Symbol</th>
<th>Port size</th>
<th>Applicable series</th>
</tr>
</thead>
<tbody>
<tr>
<td>01</td>
<td>1/8</td>
<td>51-SY5000</td>
</tr>
<tr>
<td>02</td>
<td>1/4</td>
<td>51-SY7000</td>
</tr>
</tbody>
</table>

**One-touch fitting**

<table>
<thead>
<tr>
<th>Symbol</th>
<th>Port size</th>
<th>Applicable series</th>
</tr>
</thead>
<tbody>
<tr>
<td>C4</td>
<td>ø4 one-touch fitting</td>
<td>51-SY5000</td>
</tr>
<tr>
<td>C6</td>
<td>ø6 one-touch fitting</td>
<td>51-SY5000</td>
</tr>
<tr>
<td>C8</td>
<td>ø8 one-touch fitting</td>
<td>51-SY5000</td>
</tr>
<tr>
<td>C10</td>
<td>ø10 one-touch fitting</td>
<td>51-SY7000</td>
</tr>
</tbody>
</table>

**Manual override**

- Nil: Non-locking push type
- D: Push-tum locking slotted type
- E: Push-tum locking lever type

**Lead wire length**

<table>
<thead>
<tr>
<th>Symbol</th>
<th>Lead wire length</th>
<th>Note</th>
</tr>
</thead>
<tbody>
<tr>
<td>3</td>
<td>300 mm</td>
<td>—</td>
</tr>
<tr>
<td>6</td>
<td>600 mm</td>
<td>Maximum length 600 mm for L-type</td>
</tr>
<tr>
<td>10</td>
<td>1000 mm</td>
<td>—</td>
</tr>
<tr>
<td>15</td>
<td>1500 mm</td>
<td>—</td>
</tr>
<tr>
<td>20</td>
<td>2000 mm</td>
<td>—</td>
</tr>
<tr>
<td>30</td>
<td>3000 mm</td>
<td>—</td>
</tr>
<tr>
<td>100</td>
<td>10000 mm</td>
<td>Semi-standard</td>
</tr>
</tbody>
</table>

**Warning**

If a resin tube is used, take measures against static electricity.

**Note**

When placing an order for body ported solenoid valve as a single unit, mounting screws and a gasket for manifold are not attached. Order them separately, if necessary. (For details, refer to page 32.)
Manifold Specifications

<table>
<thead>
<tr>
<th>Model</th>
<th>51-SS5Y5-20</th>
<th>51-SS5Y7-20</th>
</tr>
</thead>
<tbody>
<tr>
<td>Applicable valve</td>
<td>51-SY5□20</td>
<td>51-SY7□20</td>
</tr>
</tbody>
</table>

Manifold type
- Single base B mount

P (SUP)/R (EXH)
- Common SUP/EXH

Valve stations
- 2 to 20 stations (Note 1)

A, B port location
- Valve

<table>
<thead>
<tr>
<th>Port size</th>
<th>P, EA, EB port</th>
<th>A, B port</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>1/8</td>
<td></td>
</tr>
<tr>
<td></td>
<td>C4 (ø4 one-touch fitting)</td>
<td>C8 (ø8 one-touch fitting)</td>
</tr>
<tr>
<td></td>
<td>C6 (ø6 one-touch fitting)</td>
<td>C10 (ø10 one-touch fitting)</td>
</tr>
</tbody>
</table>

Manifold base mass W (g)

<table>
<thead>
<tr>
<th>n: Stations</th>
<th>W = 36n + 64</th>
</tr>
</thead>
<tbody>
<tr>
<td>W = 43n + 64</td>
<td></td>
</tr>
</tbody>
</table>

Note 1) For 10 stations or more (5 stations or more for the 51-SS5Y7), supply pressure to P port on both sides and exhaust from EA/EB port on both sides.

Note 2) Refer to “Manifold Options” on page 32.

⚠️ Warning  If a resin tube is used, take measures against static electricity.

Flow-rate Characteristics

<table>
<thead>
<tr>
<th>Model</th>
<th>Port size</th>
<th>Flow-rate characteristics</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>1, 5, 3 P, EA, EB</td>
<td>1→4/2 (P→A/B)</td>
</tr>
<tr>
<td>51-SS5Y5-20</td>
<td>1/4</td>
<td>C8</td>
</tr>
<tr>
<td>51-SS5Y7-20</td>
<td>1/4</td>
<td>C10</td>
</tr>
</tbody>
</table>

Note) The value is for manifold base with 5 stations and individually operated 2-position type.
### Dimensions: 51-SY7000

**L-type plug connector (L)**

51-SS5Y7-20-[Stations]-

---

**L-type plug connector with cover (LL)**

51-SS5Y7-20-[Stations]-

---

**With IP65 compliant cable (TT)**

51-SS5Y7-20-[Stations]-

---

<table>
<thead>
<tr>
<th>Stations</th>
<th>L1</th>
<th>L2</th>
</tr>
</thead>
<tbody>
<tr>
<td>2 stations</td>
<td>55</td>
<td>74</td>
</tr>
<tr>
<td>3 stations</td>
<td>93</td>
<td>112</td>
</tr>
<tr>
<td>4 stations</td>
<td>131</td>
<td>150</td>
</tr>
<tr>
<td>5 stations</td>
<td>169</td>
<td>188</td>
</tr>
<tr>
<td>6 stations</td>
<td>207</td>
<td>226</td>
</tr>
<tr>
<td>7 stations</td>
<td>245</td>
<td>264</td>
</tr>
<tr>
<td>8 stations</td>
<td>283</td>
<td>302</td>
</tr>
<tr>
<td>9 stations</td>
<td>321</td>
<td>340</td>
</tr>
<tr>
<td>10 stations</td>
<td>359</td>
<td>378</td>
</tr>
<tr>
<td>11 stations</td>
<td>397</td>
<td>416</td>
</tr>
</tbody>
</table>

**51-SY5000/7000**

- **Manual override**
- **4 x ø4.5 (Mounting hole)**
- **P = 19**
- **1/4" (A(4), B(2) port)**
- **6 x 1/4" (P(1), EA(5), EB(3) port)**

---

**Series 51-SY5000/7000**

**Stations n 2 stations**

55

**Stations n 3 stations**

65

**Stations n 4 stations**

74

**Stations n 5 stations**

84

**Stations n 6 stations**

93

**Stations n 7 stations**

103

**Stations n 8 stations**

112

**Stations n 9 stations**

122

**Stations n 10 stations**

131

**Stations n 11 stations**

141

**Stations n 12 stations**

150

**Stations n 13 stations**

169

**Stations n 14 stations**

188

**Stations n 15 stations**

207

**Stations n 16 stations**

226

**Stations n 17 stations**

245

**Stations n 18 stations**

264

**Stations n 19 stations**

283

**Stations n 20 stations**

302

---

**L-type plug connector with cover (LL)**

51-SS5Y7-20-[Stations]-

---

**With IP65 compliant cable (TT)**

51-SS5Y7-20-[Stations]-
Manifold Options

■ Type 20
Blanking Plate Assembly

- Round head combination screw

<table>
<thead>
<tr>
<th>Series</th>
<th>Assembly part no.</th>
<th>Port size t</th>
</tr>
</thead>
<tbody>
<tr>
<td>51-SY5000</td>
<td>SY5000-26-20A</td>
<td>1/8 15</td>
</tr>
<tr>
<td>51-SY7000</td>
<td>SY7000-26-22A</td>
<td>1/4 18</td>
</tr>
</tbody>
</table>

■ Gasket Assembly Part No.

- Note) Gasket assembly consists of 10 sets of mounting screws and a gasket.

<table>
<thead>
<tr>
<th>Series</th>
<th>Gasket assembly</th>
</tr>
</thead>
<tbody>
<tr>
<td>51-SY5000</td>
<td>SY5000-GS-1</td>
</tr>
<tr>
<td>51-SY7000</td>
<td>SY7000-GS-1</td>
</tr>
</tbody>
</table>

■ Individual SUP Spacer Assembly

- Individual SUP Spacer Assembly
  + Individual EXH Spacer Assembly (Double spacer)

- Note) The SUP port of the 51-SY5000/7000 may be either on the lead wire side or on the end plate side. (An assembly is shipped under the conditions shown in the figure.)

<table>
<thead>
<tr>
<th>Series</th>
<th>Assembly part no.</th>
<th>Port size t</th>
</tr>
</thead>
<tbody>
<tr>
<td>51-SY5000</td>
<td>SY5000-38-1-A</td>
<td>1/8 15</td>
</tr>
<tr>
<td>51-SY7000</td>
<td>SY7000-38-1-A</td>
<td>1/4 18</td>
</tr>
</tbody>
</table>

■ Individual EXH Spacer Assembly

- EXH port (Both sides)

<table>
<thead>
<tr>
<th>Series</th>
<th>Assembly part no.</th>
<th>Port size t</th>
</tr>
</thead>
<tbody>
<tr>
<td>51-SY5000</td>
<td>SY5000-39-1-A</td>
<td>1/8 15</td>
</tr>
<tr>
<td>51-SY7000</td>
<td>SY7000-39-1-A</td>
<td>1/4 18</td>
</tr>
</tbody>
</table>

⚠️ Caution

- * Thread type
  - Mounting screw tightening torques
    - M3: 0.8 N·m
    - M4: 1.4 N·m

⚠️ Warning

- When mounting a valve or spacer on the manifold base or sub-plate, etc., those mounting directions are determined. If mounted in the wrong direction, the equipment to be connected may cause malfunction. Refer to external dimensions, and then mount it.

Note: The SUP spacer's port does not have an orientation. As for the EXH ports, adjust the symbol "S" to the pilot valve side. Also, please make sure to connect the individual ports to protect the wiring section of the pilot valve from drainage, etc.

The individual SUP spacer and EXH spacer can be mounted either on the upper side or lower side. (The above illustration shows the condition when the product is shipped out from a factory already assembled.)
Intrinsically Safe Explosion-proof System
5 Port Solenoid Valve
Series 51-SY5000/7000
Base Mounted Manifold
Bar Stock Type

How to Order Manifold

Type 41/Compact Type

51-SS5Y 5 - 41 - 05 - 01

**Explosion-proof**

51 Intrinsically safe explosion-proof structure

**Stations**

02 2 stations
20 20 stations

+A, B port size

**Thread piping**

Symbol  Port size  Applicable series
01 1/8 51-SY5000

One-touch fitting (Metric size)

Symbol  Port size  Applicable series
C6 ø6 one-touch fitting  51-SY5000
C8 ø8 one-touch fitting  51-SY5000

One-touch fitting (Inch size)

Symbol  Port size  Applicable series
N7 ø1/4" one-touch fitting  51-SY5000
N9 ø5/16" one-touch fitting  51-SY5000

Type 42/External Pilot Capable

51-SS5Y 5 - 42 - 05 - 02

**Explosion-proof**

51 Intrinsically safe explosion-proof structure

**Stations**

02 2 stations
20 20 stations

+A, B port size

**Thread piping**

Symbol  Port size  Applicable series
02 1/4 51-SY5000  51-SY7000

One-touch fitting (Metric size)

Symbol  Port size  Applicable series
C6 ø6 one-touch fitting  51-SY5000
C8 ø8 one-touch fitting  51-SY5000
C10 ø10 one-touch fitting  51-SY7000

One-touch fitting (Inch size)

Symbol  Port size  Applicable series
N7 ø1/4" one-touch fitting  51-SY5000
N9 ø5/16" one-touch fitting  51-SY7000
N11 ø3/8" one-touch fitting  51-SY7000

How to Order Valve Manifold Assembly

**Example**

Single solenoid
51-SY5140-ALL3 (2 sets)

Double solenoid
51-SY5240-ALL3 (2 sets)

Blanking plate assembly
SY5000-26-20A (1 set)

The asterisk denotes the symbol for assembly. Prefix it to the part nos. of the solenoid valve, etc.

Add the valve and option part number under the manifold base part number. In the case of complex arrangement, specify them on the manifold specification sheet.

Type 41/Compact Type

51-SS5Y 5 - 41 - 05 - 01

**Explosion-proof**

51 Intrinsically safe explosion-proof structure

**Stations**

02 2 stations
20 20 stations

+A, B port size

**Thread piping**

Symbol  Port size  Applicable series
01 1/8 51-SY5000

One-touch fitting (Metric size)

Symbol  Port size  Applicable series
C6 ø6 one-touch fitting  51-SY5000
C8 ø8 one-touch fitting  51-SY5000

One-touch fitting (Inch size)

Symbol  Port size  Applicable series
N7 ø1/4" one-touch fitting  51-SY5000
N9 ø5/16" one-touch fitting  51-SY5000

Type 42/External Pilot Capable

51-SS5Y 5 - 42 - 05 - 02

**Explosion-proof**

51 Intrinsically safe explosion-proof structure

**Stations**

02 2 stations
20 20 stations

+A, B port size

**Thread piping**

Symbol  Port size  Applicable series
02 1/4 51-SY5000  51-SY7000

One-touch fitting (Metric size)

Symbol  Port size  Applicable series
C6 ø6 one-touch fitting  51-SY5000
C8 ø8 one-touch fitting  51-SY5000
C10 ø10 one-touch fitting  51-SY7000

One-touch fitting (Inch size)

Symbol  Port size  Applicable series
N7 ø1/4" one-touch fitting  51-SY5000
N9 ø5/16" one-touch fitting  51-SY7000
N11 ø3/8" one-touch fitting  51-SY7000

**Warning**

If a resin tube is used, take measures against static electricity.
How to Order Valve

**Series**

51-SY5000
51-SY7000

**Type of actuation**

1. 2-position single
2. 2-position double
3. 3-position closed center
4. 3-position exhaust center
5. 3-position pressure center

**Pilot type**

- Nil: Internal pilot
- R: External pilot

**System**

- A: Z728.H (51-SYE100-A)
- B: MTL728P + (51-SYE100-B)
- F: KFD0-SD2-Ex1.1065 (51-SYE100-F)

**Lead wire length**

<table>
<thead>
<tr>
<th>Symbol</th>
<th>Lead wire length</th>
<th>Note</th>
</tr>
</thead>
<tbody>
<tr>
<td>3</td>
<td>300 mm</td>
<td>—</td>
</tr>
<tr>
<td>6</td>
<td>600 mm</td>
<td>Maximum length 600 mm for L-type</td>
</tr>
<tr>
<td>10</td>
<td>1000 mm</td>
<td>—</td>
</tr>
<tr>
<td>15</td>
<td>1500 mm</td>
<td>—</td>
</tr>
<tr>
<td>20</td>
<td>2000 mm</td>
<td>—</td>
</tr>
<tr>
<td>30</td>
<td>3000 mm</td>
<td>—</td>
</tr>
<tr>
<td>100</td>
<td>10000 mm</td>
<td>Semi-standard</td>
</tr>
</tbody>
</table>

**Electrical entry**

- L: L-type plug connector
- LL: L-type plug connector with cover
- TT: With IP65 compliant cable

Note 1) Attached barrier type
The numbers in ( ), 51-SYE100-□ represents SMC’s control number.
Note 2) If the barrier is not necessary due to valve replacement etc, enter O after the system symbol.
Example) 51-SY5140-AOLL3

Note) TT-type is connected to the terminal block.
Cables other than the connected one cannot be used.
## Manifold Specifications

<table>
<thead>
<tr>
<th>Model</th>
<th>51-SS5YY5-41</th>
<th>51-SS5YY5-42</th>
<th>51-SS5YY7-42</th>
</tr>
</thead>
<tbody>
<tr>
<td>Applicable valve</td>
<td>51-SY5□40</td>
<td>51-SY7□40</td>
<td></td>
</tr>
</tbody>
</table>

**Manifold type**
- Single base B mount

**P (SUP)/R (EXH)**
- Common SUP/EXH

**Valve stations**
- 2 to 20 stations (Note 1)

<table>
<thead>
<tr>
<th>A, B port location</th>
<th>Location</th>
<th>Base</th>
<th>Side</th>
</tr>
</thead>
</table>

**Port size**
- **P, EA, EB port**
  - 1/4
  - 1/8
  - C6 (ø6 one-touch fitting)
  - C8 (ø8 one-touch fitting)

**Manifold base mass W (g)**
- \( W = 61n + 101 \)
- \( W = 79n + 127 \)
- \( W = 100n + 151 \)

### Note 1)
For 10 stations or more (5 stations or more for the 51-SS5YY7), supply pressure to P port on both sides and exhaust from EA/EB port on both sides.

### Note 2)
Refer to "Manifold Options" on page 38.

## Flow-rate Characteristics

<table>
<thead>
<tr>
<th>Model</th>
<th>Port size</th>
<th>Flow-rate characteristics</th>
<th>1→4/2 (P→A/B)</th>
<th>4/2→5/3 (A/B→EA/EB)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
<td>( C_{(mm^3/s-bar)} ) b</td>
<td>( C_{(mm^3/s-bar)} ) cv</td>
</tr>
<tr>
<td>51-SS5YY5-41</td>
<td>1/4</td>
<td>C8</td>
<td>1.8</td>
<td>0.23</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>1.9</td>
<td>0.44</td>
</tr>
<tr>
<td>51-SS5YY5-42</td>
<td>1/4</td>
<td>C8</td>
<td>1.9</td>
<td>0.20</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>1.9</td>
<td>0.46</td>
</tr>
<tr>
<td>51-SS5YY7-42</td>
<td>1/4</td>
<td>C10</td>
<td>3.0</td>
<td>0.25</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>3.0</td>
<td>0.75</td>
</tr>
</tbody>
</table>

### Note)
The value is for manifold base with 5 stations and individually operated 2-position type.
Dimensions: 51-SY5000

L-type plug connector (L)
51-SS5Y5-41- [Stations] □ □

Dimensions: 51-SY5000

L-type plug connector with cover (LL)
51-SS5Y5-41- [Stations] □ □

With IP65 compliant cable (TT)
51-SS5Y5-41- [Stations] □ □
Series 51-SY5000/7000

Dimensions: 51-SY5000

L-type plug connector (L)
51-SS5Y5-42-[Stations]-□□

L-type plug connector with cover (LL)
51-SS5Y5-42-[Stations]-□□

With IP65 compliant cable (TT)
51-SS5Y5-42-[Stations]-□□

<table>
<thead>
<tr>
<th>Stations</th>
<th>2 stations</th>
<th>3 stations</th>
<th>4 stations</th>
<th>5 stations</th>
<th>6 stations</th>
<th>7 stations</th>
<th>8 stations</th>
<th>9 stations</th>
<th>10 stations</th>
<th>11 stations</th>
<th>12 stations</th>
<th>13 stations</th>
<th>14 stations</th>
<th>15 stations</th>
<th>16 stations</th>
<th>17 stations</th>
<th>18 stations</th>
<th>19 stations</th>
<th>20 stations</th>
</tr>
</thead>
<tbody>
<tr>
<td>L1</td>
<td>59.5</td>
<td>77</td>
<td>94.5</td>
<td>112</td>
<td>129.5</td>
<td>147</td>
<td>164.5</td>
<td>182</td>
<td>199.5</td>
<td>217</td>
<td>234.5</td>
<td>252</td>
<td>269.5</td>
<td>287</td>
<td>304.5</td>
<td>322</td>
<td>339.5</td>
<td>357</td>
<td>374.5</td>
</tr>
<tr>
<td>L2</td>
<td>49.5</td>
<td>67</td>
<td>84.5</td>
<td>102</td>
<td>119.5</td>
<td>137</td>
<td>154.5</td>
<td>172</td>
<td>189.5</td>
<td>207</td>
<td>224.5</td>
<td>242</td>
<td>259.5</td>
<td>277</td>
<td>294.5</td>
<td>312</td>
<td>329.5</td>
<td>347</td>
<td>364.5</td>
</tr>
</tbody>
</table>
Dimensions: 51-SY7000

L-type plug connector (L)
51-SS5Y7-42-[Stations]-□□

L-type plug connector with cover (LL)
51-SS5Y7-42-[Stations]-□□

With IP65 compliant cable (TT)
51-SS5Y7-42-[Stations]-□□

<table>
<thead>
<tr>
<th>Stations n</th>
<th>2 stations</th>
<th>3 stations</th>
<th>4 stations</th>
<th>5 stations</th>
<th>6 stations</th>
<th>7 stations</th>
<th>8 stations</th>
<th>9 stations</th>
<th>10 stations</th>
<th>11 stations</th>
<th>12 stations</th>
<th>13 stations</th>
<th>14 stations</th>
<th>15 stations</th>
<th>16 stations</th>
<th>17 stations</th>
<th>18 stations</th>
<th>19 stations</th>
<th>20 stations</th>
</tr>
</thead>
<tbody>
<tr>
<td>L1</td>
<td>61</td>
<td>80</td>
<td>99</td>
<td>118</td>
<td>137</td>
<td>156</td>
<td>175</td>
<td>194</td>
<td>213</td>
<td>232</td>
<td>251</td>
<td>270</td>
<td>289</td>
<td>308</td>
<td>327</td>
<td>346</td>
<td>365</td>
<td>384</td>
<td>403</td>
</tr>
<tr>
<td>L2</td>
<td>49</td>
<td>68</td>
<td>87</td>
<td>106</td>
<td>125</td>
<td>144</td>
<td>163</td>
<td>182</td>
<td>201</td>
<td>220</td>
<td>239</td>
<td>258</td>
<td>277</td>
<td>296</td>
<td>315</td>
<td>334</td>
<td>353</td>
<td>372</td>
<td>391</td>
</tr>
</tbody>
</table>
### Series 51-SY5000/7000

#### Manifold Options

- **Type 41, 42**
  - Blanking Plate Assembly

![Blanking Plate Assembly Diagram]

<table>
<thead>
<tr>
<th>Series</th>
<th>Assembly part no.</th>
</tr>
</thead>
<tbody>
<tr>
<td>51-SY5000</td>
<td>SY5000-26-20A</td>
</tr>
<tr>
<td>51-SY7000</td>
<td>SY7000-26-22A</td>
</tr>
</tbody>
</table>

- **Gasket Assembly Part No.**

![Gasket Assembly Diagram]

<table>
<thead>
<tr>
<th>Series</th>
<th>Gasket assembly</th>
</tr>
</thead>
<tbody>
<tr>
<td>51-SY5000</td>
<td>SY5000-GS-2</td>
</tr>
<tr>
<td>51-SY7000</td>
<td>SY7000-GS-2</td>
</tr>
</tbody>
</table>

- **Individual SUP Spacer Assembly**

![Individual SUP Spacer Assembly Diagram]

<table>
<thead>
<tr>
<th>Series</th>
<th>Assembly part no.</th>
<th>Port size</th>
<th>t</th>
</tr>
</thead>
<tbody>
<tr>
<td>51-SY5000</td>
<td>SY5000-38-16A</td>
<td>1/8</td>
<td>15</td>
</tr>
<tr>
<td>51-SY7000</td>
<td>SY7000-38-16A</td>
<td>1/4</td>
<td>18</td>
</tr>
</tbody>
</table>

Note) The SUP port of the 51-SY5000/7000 may be either on the lead wire side or on the end plate side. (An assembly is shipped under the conditions shown in the figure.)

- **Individual EXH Spacer Assembly**

![Individual EXH Spacer Assembly Diagram]

<table>
<thead>
<tr>
<th>Series</th>
<th>Assembly part no.</th>
<th>Port size</th>
<th>t</th>
</tr>
</thead>
<tbody>
<tr>
<td>51-SY5000</td>
<td>SY5000-39-16-16A</td>
<td>1/8</td>
<td>15</td>
</tr>
<tr>
<td>51-SY7000</td>
<td>SY7000-39-16-16A</td>
<td>1/4</td>
<td>18</td>
</tr>
</tbody>
</table>

Note) Gasket assembly consists of 10 sets of mounting screws and a gasket.

- **Individual SUP Spacer Assembly**

![Individual SUP Spacer Assembly Diagram]

<table>
<thead>
<tr>
<th>Series</th>
<th>Individual SUP + Individual EXH assembly part no.</th>
<th>Port size</th>
</tr>
</thead>
<tbody>
<tr>
<td>51-SY5000</td>
<td>SY5000-75-1-A</td>
<td>1/8</td>
</tr>
<tr>
<td>51-SY7000</td>
<td>SY7000-73-1-A</td>
<td>1/4</td>
</tr>
</tbody>
</table>

Note) The port on a spacer can be directed to the pilot valve side or end plate side. For mounting the port to the pilot valve side, please make sure to connect the ports to protect the pilot valve wiring section from drainage. The individual SUP spacer and EXH spacer can be mounted either on the upper side or lower side. (The above illustration shows the condition when the product is shipped out from a factory already assembled.)

- **Plug (White)**

![Plug (White) Diagram]

These are inserted in unused cylinder ports and SUP, EXH ports. Purchasing order is available in units of 10 pieces.

### Thread type

- Nill: Rc
- F: G
- N: NPT
- T: NPTF

### Mounting screw tightening torques

- M3: 0.8 N·m
- M4: 1.4 N·m

### Caution

- When mounting a valve or spacer on the manifold base or sub-plate, etc., those mounting directions are determined. If mounted in the wrong direction, the equipment to be connected may cause malfunction. Refer to external dimensions, and then mount it.

### Warning

- Applicable fittings size øD

<table>
<thead>
<tr>
<th>Model</th>
<th>A</th>
<th>L</th>
<th>D</th>
</tr>
</thead>
<tbody>
<tr>
<td>KQ2P-06</td>
<td>18</td>
<td>35</td>
<td>8</td>
</tr>
<tr>
<td>KQ2P-08</td>
<td>20.5</td>
<td>39</td>
<td>10</td>
</tr>
<tr>
<td>KQ2P-10</td>
<td>22</td>
<td>43</td>
<td>12</td>
</tr>
<tr>
<td>KQ2P-07</td>
<td>18</td>
<td>35</td>
<td>8.5</td>
</tr>
<tr>
<td>KQ2P-09</td>
<td>20.5</td>
<td>39</td>
<td>10</td>
</tr>
<tr>
<td>KQ2P-11</td>
<td>22</td>
<td>43</td>
<td>11.5</td>
</tr>
</tbody>
</table>
Manifold Options

■ How to Order Interface Regulator

Series 51-SY5000

ARBY5000-00-P-2

Pressure gauge connection port

<table>
<thead>
<tr>
<th>00</th>
<th>Pressure gauge (G15-10-01)</th>
</tr>
</thead>
<tbody>
<tr>
<td>M1</td>
<td>Plug (M-5P)</td>
</tr>
</tbody>
</table>

Regulating port

<table>
<thead>
<tr>
<th>P</th>
<th>P port</th>
</tr>
</thead>
<tbody>
<tr>
<td>A1</td>
<td>A port (P controlled, A regulated)</td>
</tr>
<tr>
<td>B1</td>
<td>B port (P controlled, B regulated)</td>
</tr>
</tbody>
</table>

Series 51-SY7000

ARBY7000-00-P-2

Pressure gauge connection port

<table>
<thead>
<tr>
<th>00</th>
<th>Pressure gauge (G15-10-01)</th>
</tr>
</thead>
<tbody>
<tr>
<td>M1</td>
<td>Plug (M-5P)</td>
</tr>
</tbody>
</table>

Regulating port

<table>
<thead>
<tr>
<th>P</th>
<th>P port</th>
</tr>
</thead>
<tbody>
<tr>
<td>A1</td>
<td>A port (P controlled, A regulated)</td>
</tr>
<tr>
<td>B1</td>
<td>B port (P controlled, B regulated)</td>
</tr>
</tbody>
</table>

Accessory

<table>
<thead>
<tr>
<th>Series</th>
<th>Round head combination screw</th>
<th>Gasket</th>
</tr>
</thead>
<tbody>
<tr>
<td>ARBY5000</td>
<td>M3 x 48.5 (Flat nickel plated)</td>
<td>SX5000-57-6</td>
</tr>
<tr>
<td>ARBY7000</td>
<td>M4 x 57 (Flat nickel plated)</td>
<td>SX7000-57-4</td>
</tr>
</tbody>
</table>

Caution

Mounting screw tightening torques

| M3: 0.8 N·m |
| M4: 1.4 N·m |
**Series 51-SY**

**Zener Diode Barrier Dimensions**

### 51-SYE100-A

- **Terminal No. indication (Hazardous side)**
  - Terminal No.1: +
  - Terminal No.2: –

- **Terminal No. indication (Non-hazardous side)**
  - Terminal No.8: +
  - Terminal No.7: –

- **Examination certificate emblem**
  - Examination certificate No. TC14452

- **Examination certificate emblem**
  - Examination certificate No. TC14453

- **Manufacturer**: Pepperl+Fuchs
- **Note**: See P+F's catalog for options.

**Caution**

Terminal No. 2, No. 7 and the DIN rail mounting bracket on the bottom part of the barrier or terminal for grounding are short circuit connected.

### Internal circuit diagram

1. **240 Ω**
2. **Fuse**
3. **Zener diode**
4. **Terminal No. 1**
5. **Terminal No. 2**
6. **Terminal No. 3**
7. **Terminal No. 4**
8. **Terminal No. 8**

### 51-SYE100-B

- **Terminal No. indication (Hazardous side)**
  - Terminal No.3: +
  - Terminal No.4: –

- **Terminal No. indication (Non-hazardous side)**
  - Terminal No.1: +
  - Terminal No.2: –

- **Examination certificate emblem**
  - Examination certificate No. TC14455

- **Manufacturer**: Measurement Technology Ltd.
- **Note**: See MTL Instruments’ catalog for options.
Series 51-SY
Insulating Barrier Dimensions

51-SYE100-F

Terminal No. indication (Hazardous side)
- Terminal: No.1: +
- Terminal: No.2: –

Terminal No. indication (Non-hazardous side)
- Terminal: No.7: +
- Terminal: No.8: –

Barrier input: 24 VDC ±10%

DIN rail mounted part (width: 35 mm)

LED: Orange (Power supply input indication)

Examination certificate emblem
(Examination certificate No. TC19711)

Note) See P+F's catalog for options.

Manufacturer: Pepperl+Fuchs

Manufacturer: Pepperl+Fuchs

Manufacturer: Pepperl+Fuchs

Manufacturer: Pepperl+Fuchs

Manufacturer: Pepperl+Fuchs

Manufacturer: Pepperl+Fuchs

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Manufacturer: Pepperl+Fuchs

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Manufacturer: Pepperl+Fuchs

Manufacturer: Pepperl+Fuchs

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Manufacturer: Pepperl+Fuchs

Manufacturer: Pepperl+Fuchs

Manufacturer: Pepperl+Fuchs

Manufacturer: Pepperl+Fuchs

Manufacturer: Pepperl+Fuchs

Manufacturer: Pepperl+Fuchs

Manufacturer: Pepperl+Fuchs

Manufacturer: Pepperl+Fuchs

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Safety Instructions

These safety instructions are intended to prevent hazardous situations and/or equipment damage. These instructions indicate the level of potential hazard with the labels of “Caution,” “Warning” or “Danger.” They are all important notes for safety and must be followed in addition to International Standards (ISO/IEC)*1, and other safety regulations.

*1) ISO 4414: Pneumatic fluid power – General rules relating to systems.
ISO 4413: Hydraulic fluid power – General rules relating to systems.
IEC 60204-1: Safety of machinery – Electrical equipment of machines. (Part 1: General requirements)
ISO 10218-1: Manipulating industrial robots - Safety.
etc.

⚠️ Caution: Caution indicates a hazard with a low level of risk which, if not avoided, could result in minor or moderate injury.

⚠️ Warning: Warning indicates a hazard with a medium level of risk which, if not avoided, could result in death or serious injury.

⚠️ Danger: Danger indicates a hazard with a high level of risk which, if not avoided, will result in death or serious injury.

⚠️ Warning

1. **The compatibility of the product is the responsibility of the person who designs the equipment or decides its specifications.**
   Since the product specified here is used under various operating conditions, its compatibility with specific equipment must be decided by the person who designs the equipment or decides its specifications based on necessary analysis and test results. The expected performance and safety assurance of the equipment will be the responsibility of the person who has determined its compatibility with the product. This person should also continuously review all specifications of the product referring to its latest catalog information, with a view to giving due consideration to any possibility of equipment failure when configuring the equipment.

2. **Only personnel with appropriate training should operate machinery and equipment.**
   The product specified here may become unsafe if handled incorrectly. The assembly, operation and maintenance of machines or equipment including our products must be performed by an operator who is appropriately trained and experienced.

3. **Do not service or attempt to remove product and machinery/equipment until safety is confirmed.**
   1. The inspection and maintenance of machinery/equipment should only be performed after measures to prevent falling or runaway of the driven objects have been confirmed.
   2. When the product is to be removed, confirm that the safety measures as mentioned above are implemented and the power from any appropriate source is cut, and read and understand the specific product precautions of all relevant products carefully.
   3. Before machinery/equipment is restarted, take measures to prevent unexpected operation and malfunction.

4. **Contact SMC beforehand and take special consideration of safety measures if the product is to be used in any of the following conditions.**
   1. Conditions and environments outside of the given specifications, or use outdoors or in a place exposed to direct sunlight.
   2. Installation on equipment in conjunction with atomic energy, railways, air navigation, space, shipping, vehicles, military, medical treatment, combustion and recreation, or equipment in contact with food and beverages, emergency stop circuits, clutch and brake circuits in press applications, safety equipment or other applications unsuitable for the standard specifications described in the product catalog.
   3. An application which could have negative effects on people, property, or animals requiring special safety analysis.
   4. Use in an interlock circuit, which requires the provision of double interlock for possible failure by using a mechanical protective function, and periodical checks to confirm proper operation.
Safety Instructions

⚠️ Caution

1. The product is provided for use in manufacturing industries.
   The product herein described is basically provided for peaceful use in manufacturing industries.
   If considering using the product in other industries, consult SMC beforehand and exchange specifications or a contract if necessary.
   If anything is unclear, contact your nearest sales branch.

Limited warranty and Disclaimer/Compliance Requirements

The product used is subject to the following “Limited warranty and Disclaimer” and “Compliance Requirements”. Read and accept them before using the product.

Limited warranty and Disclaimer

1. The warranty period of the product is 1 year in service or 1.5 years after the product is delivered. *(2)*
   Also, the product may have specified durability, running distance or replacement parts. Please consult your nearest sales branch.

2. For any failure or damage reported within the warranty period which is clearly our responsibility, a replacement product or necessary parts will be provided.
   This limited warranty applies only to our product independently, and not to any other damage incurred due to the failure of the product.

3. Prior to using SMC products, please read and understand the warranty terms and disclaimers noted in the specified catalog for the particular products.

   *(2)* Vacuum pads are excluded from this 1 year warranty.  
   A vacuum pad is a consumable part, so it is warranted for a year after it is delivered.
   Also, even within the warranty period, the wear of a product due to the use of the vacuum pad or failure due to the deterioration of rubber material are not covered by the limited warranty.

Compliance Requirements

1. The use of SMC products with production equipment for the manufacture of weapons of mass destruction (WMD) or any other weapon is strictly prohibited.

2. The exports of SMC products or technology from one country to another are governed by the relevant security laws and regulations of the countries involved in the transaction. Prior to the shipment of a SMC product to another country, assure that all local rules governing that export are known and followed.
**Series 51-SY5000/7000/9000 Specific Product Precautions 1**

Be sure to read before handling.
Refer to back pages 1 and 2 for Safety Instructions, “Handling Precautions for SMC Products” (M-E03-3) for 3/4/5 Port Solenoid Valves Precautions.

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**Manual Override**

**Warning**

- **Non-locking push type [Standard]**
  Press in the direction of the arrow.

- **Push-turn locking slotted type [Type D]**
  While pressing, turn in the direction of the arrow.
  If it is not turned, it can be operated the same way as the non-locking type.

- **Push-turn locking lever type [Type E]**
  While pressing, turn it the direction of the arrow.
  If it is not turned, it can be operated the same way as the non-locking type.

**Exhaust Side**

**Caution**

When operating the locking type D with a screwdriver, turn it gently using a watchmaker’s screwdriver.
[Torque: Less than 0.1 N·m]

**Caution**

In case of using a 5-port valve as a 3-port valve

- The 51-SY series pilot valve and main valve share a common exhaust inside the valve. Therefore, do not block the exhaust port when arranging the piping.

### Series 51-SY5000/7000/9000 Used as a 3-Port Valve

<table>
<thead>
<tr>
<th>Number of solenoids</th>
<th>Plug position</th>
<th>A port</th>
<th>B port</th>
</tr>
</thead>
<tbody>
<tr>
<td>Single</td>
<td>Plug</td>
<td>Plug</td>
<td>Plug</td>
</tr>
<tr>
<td>Double</td>
<td>Plug</td>
<td>Plug</td>
<td>Plug</td>
</tr>
</tbody>
</table>

**Caution**

1. **How to Use Plug Connector**

   - **1. Attaching and detaching connectors**
     - To attach a connector, hold the lever and connector unit between your fingers and insert straight onto the pins of the solenoid valve so that the lever’s pawl is pushed into the groove and locks.
     - To detach a connector, remove the pawl from the groove by pushing the lever downward with your thumb, and pull the connector straight out.

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Back page 3
How to Order Interface Regulator

Note 1) Pressurize the interface regulator from P port on the base.
Note 2) With closed center and pressure center valves, the pressure can be regulated through P port only.
Note 3) Effective area, excluding the regulated port, when an inlet pressure of 0.5 MPa is supplied with regulators mounted on the solenoid valves (2-position) and sub-plate. Refer to “Flow-rate Characteristics” regarding the regulated port.
Note 4) Valves for mass include gasket and mounting screws.
Note 5) With A, B ports regulated (P controlled, A regulated) decreases as shown in the graph below when the set pressure is 0.25 MPa or less.

<table>
<thead>
<tr>
<th>Interface regulator model</th>
<th>ARBY5000-□-P-2</th>
<th>ARBY5000-□-□-2</th>
<th>ARBY7000-□-P-2</th>
<th>ARBY7000-□-□-2</th>
</tr>
</thead>
<tbody>
<tr>
<td>Applicable solenoid valve model</td>
<td>51-SY5□40(R)</td>
<td>51-SY7□40(R)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Regulated port</td>
<td>P</td>
<td>A</td>
<td>B</td>
<td>P</td>
</tr>
<tr>
<td>Set pressure range</td>
<td>0.1 to 0.7 MPa</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Maximum operating pressure</td>
<td>0.7 MPa</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Fluid</td>
<td>Air</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Ambient and fluid temperature</td>
<td>Max. 50°C</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Pressure gauge connection port</td>
<td>M5 x 0.8</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Mass</th>
<th>With pressure gauge</th>
<th>66.8 g</th>
<th>110.8 g</th>
</tr>
</thead>
<tbody>
<tr>
<td>With plug</td>
<td>60.4 g</td>
<td>103.2 g</td>
<td></td>
</tr>
<tr>
<td>Effective area on supply side</td>
<td>P→A, B</td>
<td>7.61 mm²</td>
<td>13.54 mm²</td>
</tr>
<tr>
<td></td>
<td>A, B→EA, EB</td>
<td>11.1 mm²</td>
<td>15.71 mm²</td>
</tr>
<tr>
<td>Effective area on exhaust side</td>
<td>P→11.1 mm²</td>
<td>10.1 mm²</td>
<td>15.71 mm²</td>
</tr>
</tbody>
</table>

Note 1) Pressurize the interface regulator from P port on the base.
Note 2) With closed center and pressure center valves, the pressure can be regulated through P port only.
Note 3) Effective area, excluding the regulated port, when an inlet pressure of 0.5 MPa is supplied with regulators mounted on the solenoid valves (2-position) and sub-plate. Refer to “Flow-rate Characteristics” regarding the regulated port.
Note 4) Valves for mass include gasket and mounting screws.
Note 5) With A, B ports regulated (P controlled, A regulated), the effective area (Cv factor) for the regulated port and unregulated passage (P→B or P→A) decreases as shown in the graph below when the set pressure is 0.25 MPa or less.

![Graph showing effective area vs. set pressure](image)

### Symbol
- **P port regulated**
- **A port regulated** (P controlled, A regulated)
- **B port regulated** (P controlled, B regulated)

### How to Order Interface Regulator

**ARBY5000**—**00**—**P**—**2**

- **Regulated port**: P port
- **Pressure gauge connection port**: 00 Pressure gauge (G15-10-01)
- **Plug (M-5P)**

**ARBY7000**—**00**—**P**—**2**

- **Regulated port**: P port
- **Pressure gauge connection port**: 00 Pressure gauge (G15-10-01)
- **Plug (M-5P)**
Flow-rate Characteristics (Conditions: Inlet pressure 0.7 MPa when 2-position solenoid valve is mounted.)

<table>
<thead>
<tr>
<th>ARBY5000</th>
<th>A1 regulated (P→A),</th>
</tr>
</thead>
<tbody>
<tr>
<td>P regulated (P→A, B)</td>
<td>B1 regulated (P→B)</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>ARBY7000</th>
<th>A1 regulated (P→A),</th>
</tr>
</thead>
<tbody>
<tr>
<td>P regulated (P→A, B)</td>
<td>B1 regulated (P→B)</td>
</tr>
</tbody>
</table>
One-touch Fittings

⚠️ Warning
1. Please take antistatic precautions appropriate to the use of resin tubing.
Refer to “Recommended Practices for Explosion-Protected Electrical Installations in General Industries” issued by Technology Institution of Industrial Safety.

⚠️ Caution
The pitch determined for each of the 51-SY series piping ports (P, A, B, etc.) is based on the assumption that KJ series one-touch fittings will be used. For this reason, other pipe fittings may interfere with each other depending on their type and size. Dimensions should be confirmed in a pipe fitting catalog before they are used.

- Tubing attachment/detachment for one-touch fittings

1) Attaching of tubing
   1. Take a tubing having no flaws on its periphery and cut it off at a right angle. When cutting the tubing, use tubing cutters TK-1, 2 or 3. Do not use pinchers, nippers or scissors, etc. If cutting is done with tools other than tubing cutters, the tubing may be cut diagonally or become flattened, etc., making a secure installation impossible, and causing problems such as the tubing pulling out after installation or air leakage. Allow some extra length in the tubing.
   2. Grasp the tubing and push it in slowly, inserting it securely all the way into the fitting.
   3. After inserting the tubing, pull on it lightly to confirm that it will not come out. If it is not installed securely all the way into the fitting, this can cause problems such as air leakage or the tubing pulling out.

2) Detaching of tubing
   1. Push in the release button sufficiently, pushing its collar equally around the circumference.
   2. Pull out the tubing while holding down the release button so that it does not come out. If the release button is not pressed down sufficiently, there will be increased bite on the tubing and it will become more difficult to pull it out.
   3. When the removed tubing is to be used again, cut off the portion which has been chewed before reusing it. If the chewed portion of the tubing is used as is, this can cause trouble such as air leakage or difficulty in removing the tubing.

- The pitch determined for each of the 51-SY series piping ports (A, B, etc.) is based on the assumption that KJ series one-touch fittings will be used. For this reason, other pipe fittings may interfere with each other depending on their type and size. Dimensions should be confirmed in a pipe fitting catalog before they are used.

Other Tubing Brands

⚠️ Caution
1. When using other than SMC brand tubing, confirm that the following specifications are satisfied with respect to the outside diameter tolerance of the tubing.
   1) Nylon tubing within ±0.1 mm
   2) Soft nylon tubing within ±0.1 mm
   3) Polyurethane tubing within +0.15 mm, within –0.2 mm.

Do not use tubing which do not meet these outside diameter tolerances. It may not be possible to connect them, or they may cause other trouble, such as air leakage or the tubing pulling out after connection.

Solenoid Valve Mounting

Mount it so that there is no slippage or deformation in gaskets, and tighten with the tightening torque as shown below.

<table>
<thead>
<tr>
<th>Model</th>
<th>Thread size</th>
<th>Tightening torque</th>
</tr>
</thead>
<tbody>
<tr>
<td>51-SY5000</td>
<td>M3</td>
<td>0.8 N·m</td>
</tr>
<tr>
<td>51-SY7000</td>
<td>M4</td>
<td>1.4 N·m</td>
</tr>
<tr>
<td>51-SY9000</td>
<td>M3</td>
<td>0.8 N·m</td>
</tr>
</tbody>
</table>

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Valve Selection for Hazardous Environment

⚠️ Warning
The explosion-proof performance of the 51-SY (intrinsically safe explosion-proof system) is ExiaIBT4 (See the reference “Explosion-proof Structure Symbol (ExiaIBT4”). Selection of a valve for a dangerous place should be done in accordance with “Recommended Practices for Explosion-Protected Electrical Installations in General Industries” issued by Technology Institution of Industrial Safety.

Classification of Hazardous Environment

⚠️ Warning
This valve should be used in a class-1 or class-2 environment by combining with a barrier (placed in non-hazardous location).

Note that this valve can not be used in a class-0 environment.

Classification of hazardous environment

- **Class-0 environment** — Not available
  A place where an explosive atmosphere is constantly generated or can be generated. Also, a place where atmosphere is above the lower limit of explosion constantly or for a long time of period is also regarded as the class-0 environment for safety season.

(Places often falling into the class-0 environment)

  a) A container of flammable liquid or space above the liquid level in the container.
  b) Around the liquid level of flammable liquid in an open container or similar place.

- **Class-1 environment** — Available
  A place where an explosive atmosphere can be generated periodically or occasionally. Also, a place which can have a dangerous concentration of explosive gas due to repair, maintenance, or leakage.

(Places often falling into the class-1 environment)

  a) Around an opening which releases explosive gas due to removal of a product during normal operation, opening/closing of a lid, or operation of a safety valve.
  b) Around the opening of a container such as a tanker and drum which is filled with flammable liquid.
  c) Around an opening which releases explosive gas due to occasional operation of a relief valve.
  d) Around the opening of a gas-vent on a tank etc.
  e) Around an opening which releases explosive gas during inspection or repair work.
  f) A room or a place which can have explosive gas due to insufficient ventilation.
  g) The part which is above the roof of a floating roof tank but within the shell.
  h) A place which can have leaked explosive gas and can accumulate the gas such as a pit.

- **Class-2 environment** — Available
  A place where explosive atmosphere can be generated under abnormal condition though an explosive atmosphere cannot be generated under normal condition.

  1) A place where flammable gas is constantly operated, but it is enclosed in an air-tight container or facility, and concentration of the gas may be thick when the container or facility gets broken due to an accident or when operation fails.
  2) A place that can have a dangerous explosive gas concentration due to the breakage of mechanical ventilation equipment though the equipment is usually reliable.

Prohibition of Disassembly and Modification

⚠️ Warning
Disassembling the pilot valve and barrier can deteriorate the explosion-proof performance, and it may lead to an accident. Therefore, please do not disassemble or modify the pilot valve and barrier.

Intrinsically Safe Explosion-proof Circuit Wiring

⚠️ Warning
Wiring of intrinsically safe explosion-proof circuits should not be routed with the other circuits. Also, it should not have electrostatic induction or electromagnetic induction.
Explosion-proof Structure Symbol (Exia/BT4)

(1) Groups of explosion-proof equipment
Explosion-proof equipment is classified into two groups depending on the place where electric equipment is used.
Group I: Electric equipment which is used in a dangerous environment within a tunnel or mine
Group II: Electric equipment which is used in a dangerous environment within a factory or office.
SMC valve belongs to Group II.

(2) Classification of gas
Classification of gas corresponds to the explosion class of gas specified in the conventional standard, and there are three classes, A, B, and C, depending on the characteristics of explosive gas. The classification of gas specifies the dangerous degree as C>B>A. SMC valve is applicable to the gases classified into A and B.

(3) Temperature class
Temperature class corresponds to the ignition degree of gas specified in the conventional standard, and there are six classes, T1 to T6. T1 is the least dangerous gas which has the highest ignition temperature, and T6 is the most dangerous gas which has the lowest ignition temperature. SMC valve is applicable to T1 to T4 temperature classes.
Safety Instructions

Be sure to read “Handling Precautions for SMC Products” (M-E03-3) before using.