Intrinsically Safe Explosion-proof System

5 Port Solenoid Valve

Compliant to International Standard (IEC 79)

The 51-SY series (system which combines a pilot valve and SMC specific barrier (safety retainer)) is certified to have explosion-proof performance of ExiaIIBT4, which is compliant with the “New Technical Standard” which was established based on the international standard (IEC 79).
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→E/A/EB)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>C[dm³/(s·bar)]</td>
<td>b</td>
<td>Cv</td>
</tr>
<tr>
<td>Body ported</td>
<td>51-SY5120-L</td>
<td>1.9</td>
<td>0.35</td>
</tr>
<tr>
<td></td>
<td>51-SY5120-LL</td>
<td>4.1</td>
<td>0.23</td>
</tr>
<tr>
<td></td>
<td>51-SY5120-TT</td>
<td>7.0</td>
<td>0.33</td>
</tr>
<tr>
<td>Base mounted</td>
<td>51-SY9120-L</td>
<td>2.4</td>
<td>0.41</td>
</tr>
<tr>
<td></td>
<td>51-SY9120-LL</td>
<td>4.1</td>
<td>0.41</td>
</tr>
<tr>
<td></td>
<td>51-SY9120-TT</td>
<td>7.9</td>
<td>0.34</td>
</tr>
</tbody>
</table>
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

51–SY 5 1 20–A LL 3–01–

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

Explosion-proof
51
Intrinsically safe
explosion-proof
structure

Type of actuation
1 2-position single
2 2-position double
3 (Note) 3-position closed center
4 (Note) 3-position exhaust center
5 (Note) 3-position pressure center

Note) 3-position type is not available for the 51-SY9000 series.

Thread type
Nil Rc
F G
N NPT
T NPTF

A, B port size

Symbol Port size Applicable series
01 1/8 51-SY5000
02 1/4 51-SY7000
03 3/8 51-SY9000

Thread piping

Symbol Port size Applicable series
C4 ø4 one-touch fitting 51-SY5000
C6 ø6 one-touch fitting 51-SY5000
C8 ø8 one-touch fitting 51-SY7000
C10 ø10 one-touch fitting 51-SY9000

One-touch fitting (Metric size) (Note)

Symbol Port size Applicable series
C4 ø4 one-touch fitting 51-SY5000
C6 ø6 one-touch fitting 51-SY5000
C8 ø8 one-touch fitting 51-SY7000
C10 ø10 one-touch fitting 51-SY9000
C12 ø12 one-touch fitting 51-SY9000

Electrical entry

Symbol Electrical entry
L L-type plug connector
LL L-type plug connector with cover
TT Terminal type

Note) The lead wire of TT-type is connected to the terminal block.

System
A Z728.H (51-SYE100-A)
B MTL728P + (51-SYE100-B)
D MTL5021 (51-SYE100-D)

Note 1) Attached barrier type
The numbers in ( ) 51-SYE100-C 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

Bracket
Nil: Without bracket
F1: With foot bracket
(2-position, single only)
F2: With side bracket

Lead wire length

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

Electrical entry

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

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

<table>
<thead>
<tr>
<th>Specifications</th>
<th>Series</th>
<th>51-SY5000</th>
<th>51-SY7000</th>
<th>51-SY9000</th>
</tr>
</thead>
<tbody>
<tr>
<td>Fluid</td>
<td>Air</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Internal pilot</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>operating pressure</td>
<td>2-position single</td>
<td>0.15 to 0.7</td>
<td></td>
<td></td>
</tr>
<tr>
<td>range (MPa)</td>
<td>2-position double</td>
<td>0.1 to 0.7</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>3-position</td>
<td>0.2 to 0.7</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Ambient and fluid</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>temperature (°C)</td>
<td>~10 to 50</td>
<td>(No freezing)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Max. operating</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>frequency (Hz)</td>
<td>2-position single, double</td>
<td>5</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>3-position</td>
<td>3</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Manual override</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>(Manual operation)</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Non-locking push type, Push-turn locking slotted type, Push-turn locking lever type</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Pilot exhaust method</td>
<td></td>
<td>Main/Pilot valve common exhaust</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Lubrication</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Not required</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Mounting orientation</td>
<td></td>
<td>Unrestricted</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Impact/Vibration</td>
<td></td>
<td>150/30</td>
<td></td>
<td></td>
</tr>
<tr>
<td>resistance (m/s²)</td>
<td></td>
<td>Note 1)</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Note 2)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Note 3)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Enclosure</td>
<td></td>
<td>IP30 (L-type), IP40 (LL-type), IP65 (TT-type)</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Note 1) Based on IEC60529
Note 2) Intrinsically safe explosion-proof structure (ia)
Note 3) Refer to the barrier dimensions on page 41 and 42.

## Solenoid Specifications

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

## Intrinsically Safe Explosion-proof System Specifications

<table>
<thead>
<tr>
<th>Type of explosion-proof structure</th>
<th>Intrinsically safe explosion-proof structure (ia) Note 1)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Applicable gas or ignition temperature of steam and explosion class</td>
<td>IIBT4</td>
</tr>
<tr>
<td>Voltage to barrier</td>
<td>24 VDC (rated voltage of system) Note 2) Note 3)</td>
</tr>
<tr>
<td>Tolerant voltage fluctuation</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>Type of actuation</th>
<th>Response time (ms) (at 0.5 MPa) Note 2)</th>
</tr>
</thead>
<tbody>
<tr>
<td>2-position single</td>
<td>26 or less 38 or less 50 or less</td>
</tr>
<tr>
<td>2-position double</td>
<td>22 or less 30 or less 50 or less</td>
</tr>
<tr>
<td>3-position</td>
<td>38 or less 56 or less —</td>
</tr>
</tbody>
</table>

Note 2) Response time becomes longer by 17 ms for system D (at ON state).
## Flow-rate Characteristics

### Series 51-SY5000

#### Valve model

<table>
<thead>
<tr>
<th>Port</th>
<th>Type of actuation</th>
<th>Port size</th>
<th>Flow-rate characteristics (Note)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>1/4, 2</td>
<td>1/4 (A → B)</td>
</tr>
<tr>
<td></td>
<td></td>
<td>(P, E, A)</td>
<td>[cm³/s bar]</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>b</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Cv</td>
</tr>
</tbody>
</table>

#### Series 51-SY5000

<table>
<thead>
<tr>
<th>Valve model</th>
<th>Type of actuation</th>
<th>Port size</th>
<th>Flow-rate characteristics (Note)</th>
</tr>
</thead>
<tbody>
<tr>
<td>51-SY5</td>
<td>Single</td>
<td>1/4</td>
<td>1.9</td>
</tr>
<tr>
<td></td>
<td>Double</td>
<td></td>
<td>0.35</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>0.49</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>2.4</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>0.39</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>0.61</td>
</tr>
</tbody>
</table>

#### Series 51-SY7000

<table>
<thead>
<tr>
<th>Valve model</th>
<th>Type of actuation</th>
<th>Port size</th>
<th>Flow-rate characteristics (Note)</th>
</tr>
</thead>
<tbody>
<tr>
<td>51-SY7</td>
<td>Single</td>
<td>1/4</td>
<td>4.1</td>
</tr>
<tr>
<td></td>
<td>Double</td>
<td></td>
<td>0.23</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>0.93</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>3.3</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>0.33</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>0.81</td>
</tr>
</tbody>
</table>

#### Series 51-SY9000

<table>
<thead>
<tr>
<th>Valve model</th>
<th>Type of actuation</th>
<th>Port size</th>
<th>Flow-rate characteristics (Note)</th>
</tr>
</thead>
<tbody>
<tr>
<td>51-SY9</td>
<td>Single</td>
<td>1/4</td>
<td>7.0</td>
</tr>
<tr>
<td></td>
<td>Double</td>
<td></td>
<td>0.33</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>1.7</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>7.6</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>0.35</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>2.0</td>
</tr>
</tbody>
</table>

### Note

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

Construction
Series SY

Symbol
2-position single

Symbol
2-position double

Symbol
3-position closed center

Symbol
3-position exhaust center

Symbol
3-position pressure center

(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 “How to Order Port Block Assembly” 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>SX1000-16-2A (with mounting screw)</td>
</tr>
<tr>
<td>Bracket (for F2)</td>
<td>SX1000-16-1A (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)
  - Port block assembly (Cassette type)
  - Fitting assembly
  - Mounting screw

**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 □ 000 – 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

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>
<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>

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>51-SY5000</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>51-SY7000</td>
</tr>
<tr>
<td>C10</td>
<td>ø10 one-touch fitting</td>
<td>51-SY9000</td>
</tr>
<tr>
<td>C12</td>
<td>ø12 one-touch fitting</td>
<td>51-SY9000</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&quot; one-touch fitting</td>
<td>51-SY5000</td>
</tr>
<tr>
<td>N7</td>
<td>ø1/4&quot; one-touch fitting</td>
<td>51-SY5000</td>
</tr>
<tr>
<td>N9</td>
<td>ø5/16&quot; one-touch fitting</td>
<td>51-SY7000</td>
</tr>
<tr>
<td>N9</td>
<td>ø5/16&quot; one-touch fitting</td>
<td>51-SY7000</td>
</tr>
<tr>
<td>N11</td>
<td>ø3/8&quot; one-touch fitting</td>
<td>51-SY9000</td>
</tr>
<tr>
<td>N9</td>
<td>ø5/16&quot; one-touch fitting</td>
<td>51-SY7000</td>
</tr>
<tr>
<td>N11</td>
<td>ø3/8&quot; one-touch fitting</td>
<td>51-SY9000</td>
</tr>
</tbody>
</table>

* Only the fitting assembly replacement is also possible.

Metric size

- 51-SY5000
  - ø4 one-touch fitting VVQ1000-51A-C4
  - ø6 one-touch fitting VVQ1000-51A-C6
  - ø8 one-touch fitting VVQ1000-51A-C8
  - ø10 one-touch fitting VVQ2000-51A-C10

- 51-SY7000
  - ø8 one-touch fitting VVQ2000-51A-C8
  - ø10 one-touch fitting VVQ2000-51A-C10

- 51-SY9000
  - ø10 one-touch fitting VVQ4000-50B-C10
  - ø12 one-touch fitting VVQ4000-50B-C12

Inch size

- 51-SY5000
  - ø5/32" one-touch fitting VVQ1000-51A-N3
  - ø1/4" one-touch fitting VVQ1000-51A-N7
  - ø5/16" one-touch fitting VVQ1000-51A-N9

- 51-SY7000
  - ø5/16" one-touch fitting VVQ2000-51A-N9
  - ø3/8" one-touch fitting VVQ2000-51A-N11

- 51-SY9000
  - ø5/16" one-touch fitting VVQ4000-50B-N9
  - 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-□L□-□-01□ (-F2)

With foot bracket
51-SY5120-□L□-□-01□-F1

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

Terminal type (TT)
51-SY5120-□TT□-□-01□ (-F2)
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)

Terminal type (TT)
51-SY5220-□TT□-01□ (-F2)
Dimensions: 51-SY5000

3-position closed center/exhaust center/pressure center
L-type plug connector (L)
51-SY5\(\frac{5}{6}\)20□L□□-01□ (-F2)

L-type plug connector with cover (LL)
51-SY5\(\frac{5}{6}\)20□LL□□-01□ (-F2)

Terminal type (TT)
51-SY5\(\frac{5}{6}\)20□TT□□-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-□L□□□-□□□-□□□-□□

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

**Terminal type (TT)**
51-SY7120-□□□□□□□□□□□-□□□-□□□ (F2)
Body Ported Series 51-SY5000/7000/9000

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)

Terminal type (TT)
51-SY7220-□TT□□-02□ (-F2)
Series 51-SY5000/7000/9000

Dimensions: 51-SY7000

3-position closed center/exhaust center/pressure center
L-type plug connector (L)
51-SY7\(\frac{1}{2}\)20-□□□-02□ (-F2)

L-type plug connector with cover (LL)
51-SY7\(\frac{1}{2}\)20-□□□□-02□ (-F2)

Terminal type (TT)
51-SY7\(\frac{1}{2}\)20-□□□□-02□ (-F2)
Dimensions: 51-SY9000

2-position single
L-type plug connector (L)
51-SY9120-□□□□-02□□

- Insulator: Black (-)
- Insulator: Red (+)
- Manual override
- 2 x 1/4", 3/8"
  (4(A), 2(B) port)
- 3 x ø3.2
  (manifold mounting hole)
- 0.3 mm²
- Lead wire length:
  L

L-type plug connector with cover (LL)
51-SY9120-□□□□-02□□

- Insulator: Red (+)
- Insulator: Black (-)
- Manual override
- 2 x ø4.4
  (Mounting hole)
- 3 x ø3.2
  (manifold mounting hole)
- 2 x 1/4"
  (1(P), 3(EB), 5(EA) port)
- 0.3 mm²
- Lead wire length:
  L

Terminal type (TT)
51-SY9120-□□□□-02□□

- Lead wire marking
  No.1 (+), No.2 (-)
- 0.75 mm²
- Max. 10
- Lead wire length:
  L

**Series 51-SY5000/7000/9000**

**Dimensions: 51-SY9000**

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

![Diagram of 2-position double L-type plug connector (L)]

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

![Diagram of L-type plug connector with cover (LL)]

**Terminal type (TT)**
51-SY9220-[□□□□□]-□□

![Diagram of Terminal type (TT)]

---

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

**Insulator**
- Red (+)
- Black (–)

**Manual override**
- 2 x 1/4", 3/8" (4(A), 2(B) port)

**Mounting hole**
- 2 x ø4.4
- 3 x ø3.2 (manifold mounting hole)

**Manifold mounting hole**
- 3 x ø3.2

**Insulator: Red (+)**
- 0.3 mm²

**Insulator: Black (–)**
- ø1.55

**Lead wire length**
- L

---

**Lead wire length**
- ø4.1

**Max. 10 L (Lead wire length)**
- 16.7

**ø4.1 L (Lead wire length)**
- 46 (E-type)

**ø1.55 L (Lead wire length)**
- (12)

---

**Insulator: Red (+)**
- ø2

**Insulator: Black (–)**
- ø0.3

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

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

**Mounting hole**
- 2 x ø4.4
- 3 x ø3.2

**Manual override**
- 2 x 1/4", 3/8" (4(A), 2(B) port)

**Mounting hole**
- 3 x ø3.2 (manifold mounting hole)

---

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

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

**Mounting hole**
- 2 x ø4.4
- 3 x ø3.2

**Manual override**
- 2 x 1/4", 3/8" (4(A), 2(B) port)

**Mounting hole**
- 3 x ø3.2 (manifold mounting hole)
Intrinsically Safe Explosion-proof System
5 Port Solenoid Valve
Series 51-SY5000/7000/9000
Base Mounted
Single Unit

How to Order

```
<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, 51-SY7000</td>
</tr>
<tr>
<td>03</td>
<td>3/8</td>
<td>51-SY5000, 51-SY9000</td>
</tr>
<tr>
<td>04</td>
<td>1/2</td>
<td>51-SY9000</td>
</tr>
</tbody>
</table>
```

51 - SY 5 2 40 - A LL -

- **Series**
  - 51-SY5000
  - 51-SY7000
  - 51-SY9000

- **Explosion-proof**
  - Intrinsically safe explosion-proof structure

- **Type of actuation**
  1. 2-position single
  2. 2-position double
  3. 3-position closed center (Note 3)
  4. 3-position exhaust center (Note 4)
  5. 3-position pressure center (Note 5)

- **Manual override**
  - Nil: Non-locking push type
  - D: Push-turn locking slotted type
  - E: Push-turn 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 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**

<table>
<thead>
<tr>
<th>Symbol</th>
<th>Electrical entry</th>
</tr>
</thead>
<tbody>
<tr>
<td>L</td>
<td>L-type plug connector</td>
</tr>
<tr>
<td>LL</td>
<td>L-type plug connector with cover</td>
</tr>
<tr>
<td>TT</td>
<td>Terminal type</td>
</tr>
</tbody>
</table>

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

- **Port size**
  - 02 1/4/ 03 3/8/ 04 1/2
  - With sub-plate

- **Pilot type**
  - Nil: Internal pilot
  - R: External pilot

- **System**
  - A: Z728.H (51-SYE100-A)
  - B: MTL728P + (51-SYE100-B)
  - D: MTL5021 (51-SYE100-D)

Note 1) Attached barrier type
The numbers in ( ), 51-SYE100-□ represents SMC’s control number.
Note 2) If the barrier is not necessary for valve replacement etc, enter O after the system symbol.
Example) 51-SYS140-A2LL3

Note) 3-position type is not available for the 51-SY9000 series.

Note) The lead wire of TT-type is connected to the terminal block.
### Specifications

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

Note) Based on IEC60529

**Electrical entry**

| Coil rated voltage     | 12 VDC |
| Allowable voltage fluctuation | –10% to +10% of rated voltage |
| Coil insulation type   | Class B |
| Power consumption      | 0.52 W (at rated voltage) |

### Solenoid Specifications

**Intrinsically Safe Explosion-proof System Specifications**

<table>
<thead>
<tr>
<th>Type of explosion-proof structure</th>
<th>Intrinsically safe explosion-proof structure (ia)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Applicable gas or ignition</td>
<td>II BT4 (Refer to the barrier dimensions on page 41 and 42.)</td>
</tr>
<tr>
<td>temperature of steam and</td>
<td></td>
</tr>
<tr>
<td>explosion class</td>
<td></td>
</tr>
<tr>
<td>Voltage to barrier</td>
<td>24 VDC (rated voltage of system) (Note 2)</td>
</tr>
<tr>
<td>Tolerant voltage fluctuation</td>
<td>Refer to the barrier dimensions on page 41 and 42.</td>
</tr>
</tbody>
</table>

**Warning**

Can not be used in a class-0 environment. Use in a class-2 or class-1 environment.

**Caution**

The valve and barrier have polarity. If voltage is supplied with wrong polarity, the barrier can not be used.

**Note 3)**

Voltage to the valve should be 10.8 VDC (minimum value).

### Response Time

**Note)** Based on dynamic performance test, JIS B 8375-1981.

(Coil temperature: 20°C, system A, B at 24 VDC)

<table>
<thead>
<tr>
<th>Type of actuation</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>

Note) Response time becomes longer by 17 ms for system D (at ON state).
## Flow-rate Characteristics

### Series 51-SY5000

<table>
<thead>
<tr>
<th>Valve model</th>
<th>Type of actuation</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>51-SY5000-40-02</td>
<td>2-position</td>
<td>1/4</td>
<td>Single</td>
<td>2.4</td>
<td>0.41</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Double</td>
<td>1.8</td>
<td>0.47</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Closed center</td>
<td>1.4</td>
<td>0.55</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Exhaust center</td>
<td>3.3</td>
<td>0.36</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Pressure center</td>
<td>2.9</td>
<td>0.64</td>
</tr>
</tbody>
</table>

### Series 51-SY7000

<table>
<thead>
<tr>
<th>Valve model</th>
<th>Type of actuation</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>51-SY7000-40-02</td>
<td>2-position</td>
<td>1/4</td>
<td>Single</td>
<td>4.1</td>
<td>0.41</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Double</td>
<td>3.0</td>
<td>0.43</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Closed center</td>
<td>2.6</td>
<td>0.42</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Exhaust center</td>
<td>5.3</td>
<td>0.39</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Pressure center</td>
<td>3.3</td>
<td>0.36</td>
</tr>
</tbody>
</table>

### Series 51-SY9000

<table>
<thead>
<tr>
<th>Valve model</th>
<th>Type of actuation</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>51-SY9000-40-03</td>
<td>2-position</td>
<td>3/8</td>
<td>Single</td>
<td>7.9</td>
<td>0.34</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Double</td>
<td>6.3</td>
<td>0.43</td>
</tr>
</tbody>
</table>

Note: [ ] : Normal position
Series 51-SY5000/7000/9000

Construction

Series SY

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>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>7</td>
<td>Gasket</td>
<td>SY5000-11-15</td>
<td>SY7000-11-11, SY9000-11-2, HNBR</td>
</tr>
<tr>
<td></td>
<td>Round head combination screw</td>
<td>M3 x 26</td>
<td>M4 x 31, SY9000-18-2 (M3 x 42), For valve mounting (Flat nickel plated)</td>
</tr>
</tbody>
</table>

Caution

Mounting screw tightening torques

M3: 0.8 N·m
M4: 1.4 N·m

* Thread type
Base Mounted Series 51-SY5000/7000/9000

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□

Terminal type (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)-□L□□-02□

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

Terminal type (TT)
51-SY5240(R)-□TT□□-02□
Dimensions: 51-SY5000

3-position closed center/exhaust center/pressure center
L-type plug connector (L)
51-SY5\(\frac{3}{4}\)40(R)-(L□□-02□)

L-type plug connector with cover (LL)
51-SY5\(\frac{3}{4}\)40(R)-(LL□□-02□)

Terminal type (TT)
51-SY5\(\frac{3}{4}\)40(R)-(TT□□-02□)
**Dimensions: 51-SY7000**

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

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

Terminal type (TT)  
51-SY7140(R)-□TT□□-□□□□
Dimensions: 51-SY7000

2-position double
L-type plug connector (L)
51-SY7240(R)-□L□□-□□

L-type plug connector with cover (LL)
51-SY7240(R)-□LL□□-□□

Terminal type (TT)
51-SY7240(R)-□TT□□-□□
### Series 51-SY5000/7000/9000

#### Dimensions: 51-SY7000

3-position closed center/exhaust center/pressure center
L-type plug connector (L)
51-SY7 5/8(R)-□L□□-□□

---

#### 51-SY7 5/8(R)-□L□□-□□

---

#### L-type plug connector with cover (LL)
51-SY7 5/8(R)-□LL□□-□□

---

#### Terminal type (TT)
51-SY7 5/8(R)-□TT□□-□□
Dimensions: 51-SY9000

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

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

Terminal type (TT)
51-SY9140-□□□□-□□
Series 51-SY5000/7000/9000

**Dimensions: 51-SY9000**

**2-position double**

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

51-SY9240-□LL□□-□□

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

51-SY9240-□LL□□-□□

**Terminal type (TT)**

51-SY9240-□TT□□-□□

---

### Insulator Color
- **Red** (+)
- **Black** (–)

### Lead Wire Length
- 0.3 mm²
- 0.75 mm²

### Piping Port
- 5 x 3/8", 1/2" (Piping port)

**Max. 10**

---

03 04
Intrinsically Safe Explosion-proof System
5 Port Solenoid Valve
Series 51-SY5000/7000
Body Ported Manifold
Bar Stock Type

**How to Order Manifold**

<table>
<thead>
<tr>
<th><strong>Manifold series</strong></th>
<th><strong>Stations</strong></th>
<th><strong>Thread type</strong></th>
</tr>
</thead>
<tbody>
<tr>
<td>51-SS5Y5</td>
<td>02</td>
<td>00F</td>
</tr>
<tr>
<td>51-SS5Y7</td>
<td>20</td>
<td>00N</td>
</tr>
<tr>
<td>51-SS5Y5</td>
<td>05</td>
<td>00T</td>
</tr>
</tbody>
</table>

- **Explosion-proof**
- **Intrinsically safe explosion-proof structure**

**Intrinsically safe explosion-proof structure**

**Double solenoid**
51-SY5220-ALL3-01 (2 sets)

**Single solenoid**
51-SY5120-ALL3-01 (2 sets)

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

**Manifold base (5 stations)**
51-SSYS5-20-05

---

**How to Order Valve Manifold Assembly**

**Example**

- **Cylinder port size**
  01: 1/8”

- **Double solenoid**
  51-SY5220-ALL3-01 (2 sets)

- **Single solenoid**
  51-SY5120-ALL3-01 (2 sets)

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

- **Manifold base (5 stations)**
  51-SSYS5-20-05

- **The asterisk denotes the symbol for assembly.**
- **Prefix it to the part nos. of the solenoid valve, etc.**
- **This also includes the number of blanking plate assemblies.**

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.
How to Order Valve

**51-SY 51 20 A LL 3 - 01**

**Explosion-proof**
- Series 51-SY5000
- Series 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)
- D MTL5021 (51-SYE100-D)

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

**Electrical entry**
- L-Type plug connector
- LL L-Type plug connector with cover
- TT Terminal type

**Lead wire length**
- Symbol: C
- Lead wire length: 300 mm
- Note: —
- Symbol: C
- Lead wire length: 600 mm
- Note: Maximum length 600 mm for L-type
- Symbol: C
- Lead wire length: 1000 mm
- Note: —
- Symbol: C
- Lead wire length: 1500 mm
- Note: —
- Symbol: C
- Lead wire length: 2000 mm
- Note: —
- Symbol: C
- Lead wire length: 3000 mm
- Note: —
- Symbol: C
- Lead wire length: 10000 mm
- Note: Semi-standard

**Manual override**
- Nil Non-locking push type
- D Push-turn locking slotted type
- E Push-turn locking lever type

**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>
<tr>
<td>Manifold type</td>
<td>Single base B mount</td>
<td>Common SUP/EXH</td>
</tr>
<tr>
<td>P (SUP)/R (EXH)</td>
<td>2 to 20 stations (Note 1)</td>
<td>2 to 20 stations (Note 1)</td>
</tr>
<tr>
<td>Valve stations</td>
<td></td>
<td></td>
</tr>
<tr>
<td>A, B port location</td>
<td>Valve</td>
<td>Valve</td>
</tr>
<tr>
<td>Port size</td>
<td></td>
<td></td>
</tr>
<tr>
<td>A, B port</td>
<td>P, EA, EB port</td>
<td>1/4</td>
</tr>
<tr>
<td>Port size</td>
<td>1/8</td>
<td>1/4</td>
</tr>
<tr>
<td>C4 (ø4 one-touch fitting)</td>
<td>C8 (ø8 one-touch fitting)</td>
<td>C10 (ø10 one-touch fitting)</td>
</tr>
<tr>
<td>C6 (ø6 one-touch fitting)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>C8 (ø8 one-touch fitting)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Manifold base mass W (g) n: Stations</td>
<td>W = 36n + 64</td>
<td>W = 43n + 64</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 1→4/2 (P→A/B)</th>
<th>4/2→5/3 (A/B→EA/EB)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>1, 5, 3 (P, EA, EB)</td>
<td>4, 2 (A, B)</td>
<td>C [dm³/(s·bar)]</td>
</tr>
<tr>
<td>51-SS5Y5-20</td>
<td>1/4</td>
<td>C8</td>
<td>1.9</td>
</tr>
<tr>
<td>51-SS5Y7-20</td>
<td>1/4</td>
<td>C10</td>
<td>3.6</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-SS5Y5-20-[Stations]-□

Terminal type (TT)
51-SS5Y5-20-[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>60</td>
<td>76</td>
<td>92</td>
<td>108</td>
<td>124</td>
<td>140</td>
<td>156</td>
<td>172</td>
<td>188</td>
<td>204</td>
<td>220</td>
<td>236</td>
<td>252</td>
<td>268</td>
<td>284</td>
<td>300</td>
<td>316</td>
<td>332</td>
<td>348</td>
</tr>
<tr>
<td>L2</td>
<td>40</td>
<td>56</td>
<td>72</td>
<td>88</td>
<td>104</td>
<td>120</td>
<td>136</td>
<td>152</td>
<td>168</td>
<td>184</td>
<td>200</td>
<td>216</td>
<td>232</td>
<td>248</td>
<td>264</td>
<td>280</td>
<td>296</td>
<td>312</td>
<td>328</td>
</tr>
</tbody>
</table>
Series 51-SY5000/7000

Dimensions: 51-SY7000

L-type plug connector (L)
51-SS5Y7-20-[Stations]-

Terminal type (TT)
51-SS5Y7-20-[Stations]-

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>66</td>
<td>85</td>
<td>104</td>
<td>123</td>
<td>142</td>
<td>161</td>
<td>180</td>
<td>199</td>
<td>218</td>
<td>237</td>
<td>256</td>
<td>275</td>
<td>294</td>
<td>313</td>
<td>332</td>
<td>351</td>
<td>370</td>
<td>389</td>
<td>408</td>
</tr>
<tr>
<td>L2</td>
<td>46</td>
<td>65</td>
<td>84</td>
<td>103</td>
<td>122</td>
<td>141</td>
<td>160</td>
<td>179</td>
<td>198</td>
<td>217</td>
<td>236</td>
<td>255</td>
<td>274</td>
<td>293</td>
<td>312</td>
<td>331</td>
<td>350</td>
<td>369</td>
<td>388</td>
</tr>
</tbody>
</table>
Manifold Options

■ Type 20
Blanking Plate Assembly

- Gasket Assembly Part No.
Round head combination screw

- Individual SUP Spacer Assembly

- Individual EXH Spacer Assembly

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

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.)

Note) The SUP spacer's port does not have an orientation. As for the EXH ports, adjust the symbol “5” 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.)

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.

<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>SY5000-39-1-A</td>
<td>1/8</td>
<td>15</td>
</tr>
<tr>
<td>51-SY7000</td>
<td>SY7000-39-1-A</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.)

Note) The SUP spacer's port does not have an orientation. As for the EXH ports, adjust the symbol “5” 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.)

<table>
<thead>
<tr>
<th>Series</th>
<th>Individual SUP + Individual EXH assembly part no.</th>
<th>Port size</th>
<th>Applicable manifold type</th>
</tr>
</thead>
<tbody>
<tr>
<td>51-SY5000</td>
<td>SY5000-75-2-A</td>
<td>1/8</td>
<td>Type 20</td>
</tr>
<tr>
<td>51-SY7000</td>
<td>SY7000-73-3-A</td>
<td>1/4</td>
<td></td>
</tr>
</tbody>
</table>

Caution
Mounting screw tightening torques

- M3: 0.8 N·m
- M4: 1.4 N·m

Thread type

<table>
<thead>
<tr>
<th>Nil</th>
<th>Rc</th>
</tr>
</thead>
<tbody>
<tr>
<td>F</td>
<td>G</td>
</tr>
<tr>
<td>N</td>
<td>NPT</td>
</tr>
<tr>
<td>T</td>
<td>NPTF</td>
</tr>
</tbody>
</table>

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.
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 05-01

Manifold series
5 51-SY5000

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

Manifold series
5 51-SY5000

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.

Warning
If a resin tube is used, take measures against static electricity.
Base Mounted *Series 51-SY5000/7000*

**How to Order Valve**

### Explosion-proof

- **Series**: 51-SY5000/7000
- **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

### Manual override

- Nil (non-locking push type)
- D (Push-turn locking slotted type)
- E (Push-turn 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>—</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>

**Lead wire length Note**

- Maximum length 600 mm for L-type

### Pilot type

- Nil (internal pilot)
- R (external pilot)

### System

- **Symbol**
  - A (Z728.H (51-SYE100-A))
  - B (MTL728P + (51-SYE100-B))
  - D (MTL5021 (51-SYE100-D))

**Note**

- Attached barrier type
  - The numbers in ( ) of 51-SYE100 represent SMC's control number.
- If the barrier is not necessary due to valve replacement etc., enter O after the system symbol.
- Example: 51-SY5140-AOLL3

### Electrical entry

- **Symbol**
  - L (L-type plug connector)
  - LL (L-type plug connector with cover)
  - TT (Terminal type)

**Note**

- The lead wire of TT-type is connected to the terminal block.
**Manifold Specifications**

<table>
<thead>
<tr>
<th>Model</th>
<th>51-SS5Y5-41</th>
<th>51-SS5Y5-42</th>
<th>51-SS5Y7-42</th>
</tr>
</thead>
<tbody>
<tr>
<td>Applicable valve</td>
<td>51-SY5 Y40</td>
<td>51-SY7 Y40</td>
<td></td>
</tr>
<tr>
<td>Manifold type</td>
<td>Single base B mount</td>
<td></td>
<td></td>
</tr>
<tr>
<td>P (SUP)/R (EXH)</td>
<td>Common SUP/EXH</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Valve stations</td>
<td>2 to 20 stations (Note 1)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>A, B port location</td>
<td>Location</td>
<td>Base</td>
<td>Side</td>
</tr>
<tr>
<td>Port size</td>
<td>P, EA, EB port</td>
<td>1/4</td>
<td></td>
</tr>
<tr>
<td>A, B port</td>
<td>Location</td>
<td>Base</td>
<td>Side</td>
</tr>
<tr>
<td>Port size</td>
<td>C6 (ø6 one-touch fitting)</td>
<td>1/8</td>
<td></td>
</tr>
<tr>
<td></td>
<td>C8 (ø8 one-touch fitting)</td>
<td>1/8</td>
<td></td>
</tr>
<tr>
<td>Manifold base mass W (g) n: Stations</td>
<td>W = 61n + 101</td>
<td>W = 79n + 127</td>
<td>W = 100n + 151</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 39.

**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>4, 2 (A, B)</td>
</tr>
<tr>
<td></td>
<td>C8</td>
<td>C10</td>
</tr>
<tr>
<td>51-SS5Y5-41</td>
<td>1/4</td>
<td>1.8</td>
</tr>
<tr>
<td>51-SS5Y5-42</td>
<td>1/4</td>
<td>1.9</td>
</tr>
<tr>
<td>51-SS5Y7-42</td>
<td>1/4</td>
<td>3.0</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]-

<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>52.5</td>
<td>68.5</td>
<td>84.5</td>
<td>100.5</td>
<td>116.5</td>
<td>132.5</td>
<td>148.5</td>
<td>164.5</td>
<td>180.5</td>
<td>196.5</td>
<td>212.5</td>
<td>228.5</td>
<td>244.5</td>
<td>260.5</td>
<td>276.5</td>
<td>292.5</td>
<td>308.5</td>
<td>324.5</td>
<td>340.5</td>
</tr>
<tr>
<td>L2</td>
<td>42</td>
<td>58</td>
<td>74</td>
<td>90</td>
<td>106</td>
<td>122</td>
<td>138</td>
<td>154</td>
<td>170</td>
<td>186</td>
<td>202</td>
<td>218</td>
<td>234</td>
<td>250</td>
<td>266</td>
<td>282</td>
<td>298</td>
<td>314</td>
<td>330</td>
</tr>
</tbody>
</table>

#### Terminal type (TT)
51-SS5Y5-41-[Stations]-

### Diagrams
- **L-type plug connector (L)**
- **Terminal type (TT)**
Dimensions: 51-SY7000

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

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

Terminal type (TT)
51-SS5Y7-42-[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>61</td>
<td>80</td>
<td>99</td>
<td>118</td>
<td>137</td>
<td>156</td>
<td>175</td>
<td>194</td>
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<td>232</td>
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<td>308</td>
<td>327</td>
<td>346</td>
<td>365</td>
<td>384</td>
<td>403</td>
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<tr>
<td>L2</td>
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<td>106</td>
<td>125</td>
<td>144</td>
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<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

<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.

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

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

#### ■ Individual SUP Spacer Assembly

<table>
<thead>
<tr>
<th>Series</th>
<th>Assembly part no.</th>
</tr>
</thead>
<tbody>
<tr>
<td>51-SY5000</td>
<td>SY5000-38-16-A</td>
</tr>
<tr>
<td>51-SY7000</td>
<td>SY7000-38-16-A</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 SUP Spacer Assembly

+ Individual EXH Spacer Assembly

(Double spacer)

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

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

### 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.

#### Caution

**Thread type**

<table>
<thead>
<tr>
<th></th>
<th>Nil</th>
<th>Rc</th>
<th>F</th>
<th>G</th>
<th>N</th>
<th>NPT</th>
<th>T</th>
<th>NPTF</th>
</tr>
</thead>
<tbody>
<tr>
<td>M3</td>
<td>0.8 N·m</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>M4</td>
<td>1.4 N·m</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

### Dimensions

<table>
<thead>
<tr>
<th>Applicable fittings size ø</th>
<th>Model</th>
<th>A</th>
<th>L</th>
<th>D</th>
</tr>
</thead>
<tbody>
<tr>
<td>6</td>
<td>KQ2P-06</td>
<td>18</td>
<td>35</td>
<td>8</td>
</tr>
<tr>
<td>8</td>
<td>KQ2P-08</td>
<td>20.5</td>
<td>39</td>
<td>10</td>
</tr>
<tr>
<td>10</td>
<td>KQ2P-10</td>
<td>22</td>
<td>43</td>
<td>12</td>
</tr>
<tr>
<td>1/4&quot;</td>
<td>KQ2P-07</td>
<td>18</td>
<td>35</td>
<td>8.5</td>
</tr>
<tr>
<td>5/16&quot;</td>
<td>KQ2P-09</td>
<td>20.5</td>
<td>39</td>
<td>10</td>
</tr>
<tr>
<td>3/8&quot;</td>
<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
00 Pressure gauge (G15-10-01)
M1 Plug (M-5P)

Regulating port
P P port
A1 A port (P controlled, A regulated)
B1 B port (P controlled, B regulated)

Series 51-SY7000

ARBY7000-00 P - 2

Pressure gauge connection port
00 Pressure gauge (G15-10-01)
M1 Plug (M-5P)

Regulating port
P P port
A1 A port (P controlled, A regulated)
B1 B port (P controlled, B regulated)

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: –

- Barrier input: 24 VDC ±10%

- Terminal for ground (2 parts)
  - (M3 Round head combination screw)

- Examination certificate emblem
  - (Examination certificate No. TC14452)

- DIN rail mountable (width: 35 mm, recommended thickness: 1.2 mm)

**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: –

- Barrier input: 24 VDC (21.6 to 24.5 VDC)

- Terminal for ground (with M nut)
  - (Terminal for earth bus bar mounting)

- Examination certificate emblem
  - (Examination certificate No. TC14453)

**Manufacturer:** Pepperl+Fuchs

*Note:* See P+F’s catalog for options.

**Manufacturer:** Measurement Technology Ltd.

*Note:* See MTL Instruments’ catalog for options.
Series 51-SY

Insulating Barrier Dimensions

51-SYE100-D

DIN rail mounted part (width: 35 mm)

Examination certificate emblem
(Examination certificate No. TC14455)

Terminal plug (2 parts)
Removable in direction A.

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

LED: Red (Power supply input indication)

Terminal No. indication (Non-hazardous side)
Terminal No.11: –
Terminal No.12: +

Barrier input: 24 VDC ±10%

Terminal: No.11
Terminal: No.12
Terminal: No.2
Terminal: No.1

Manufacturer: Measurement Technology Ltd.
Note) See MTL Instruments' catalog for options.
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.

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.

---

### 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.

### Exhaust Side

**Caution**
- 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.

---

### How to Use Plug Connector

**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]

- **Push-turn locking slotted type [Type D]**
  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.

**Caution**
- When locking the manual override on the push-turn locking types (D, E), be sure to push it down before turning. Turning without first pushing it down can cause damage to the manual override and trouble such as air leakage, etc.

---

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

**Caution**
- In case of using a 5-port valve as a 3-port valve
  The 51-SY5000/7000/9000 series can be used as normally closed (N.C.) or normally open (N.O.) 3-port port valves by closing one of the cylinder ports (A or B) with a plug. However, they should be used with the exhaust ports kept open.

<table>
<thead>
<tr>
<th>Plug position</th>
<th>B port</th>
<th>A port</th>
</tr>
</thead>
<tbody>
<tr>
<td>Type of actuation</td>
<td>N.C.</td>
<td>N.O.</td>
</tr>
<tr>
<td>Single</td>
<td>Plug (A)</td>
<td>Plug (B)</td>
</tr>
<tr>
<td>Double</td>
<td>Plug (A)</td>
<td>Plug (B)</td>
</tr>
</tbody>
</table>

---

### Back page 3
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.

Note 3)

Effective area (Cv factor)%

Set pressure (MPa)

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

ARBY7000-00-P-2

Regulated port

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

Pressure gauge connection port

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

Pressure gauge connection port

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

(Conditions: Inlet pressure 0.7 MPa when 2-position solenoid valve is mounted.)

**ARBY5000**
- P regulated (P→A, B)

**ARBY7000**
- P regulated (P→A, B)

**A1 regulated (P→A),**
**B1 regulated (P→B)**
Other Tubing Brands

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.

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>
**Warning**
The explosion-proof performance of the 51-SY (intrinsically safe explosion-proof system) is ExiaIIBT4 (See the reference “Explosion-proof Structure Symbol (ExiaIIBT4)”). 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**

### Classification of hazardous environment

<table>
<thead>
<tr>
<th>Class-0 environment</th>
<th>Not available</th>
</tr>
</thead>
<tbody>
<tr>
<td>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.</td>
<td></td>
</tr>
</tbody>
</table>

**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 |
<table>
<thead>
<tr>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>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.</td>
<td></td>
</tr>
</tbody>
</table>

**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 |
<table>
<thead>
<tr>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>A place where explosive atmosphere can be generated under abnormal condition though an explosive atmosphere cannot be generated under normal condition.</td>
<td></td>
</tr>
</tbody>
</table>

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.
(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.

Record of changes
Edition B
- Deleted the system “C” and “E” from How to Order on page 1, 14, 28, 34.
- Deleted the 51-SYE100-C from Zener Diode Barrier Dimensions on page 41.
- Deleted the 51-SYE100-E from Insulating Barrier Dimensions on page 42.