



# ***Intrinsically Safe Valve***

## **5 Port Solenoid Valve**



- **UL Listed Intrinsically Safe Valve**
- **Designed for Use in Intrinsically Safe Environment**
- **UL913 & CSA157 Compliant**



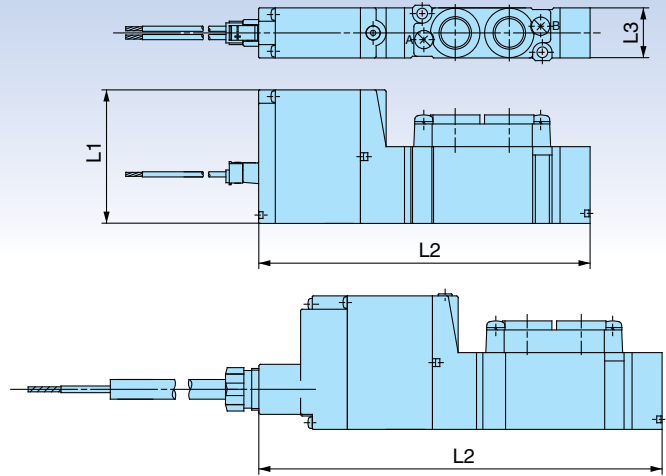
**53-SY5000/7000/9000 Series**

NC300C

# Compact, High Flow

## Dimensions

| Dimension    | (mm) |       |    |
|--------------|------|-------|----|
| Model        | L1   | L2    | L3 |
| 53-SY5120-L  | 40   | 104   | 15 |
| 53-SY5120-LL |      | 120.8 |    |
| 53-SY7120-L  |      | 118.2 |    |
| 53-SY7120-LL |      | 135   |    |
| 53-SY9120-L  | 42   | 148.3 | 23 |
| 53-SY9120-LL |      | 165.1 |    |
| 53-SY9120-TT |      |       |    |



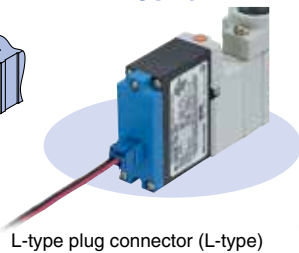
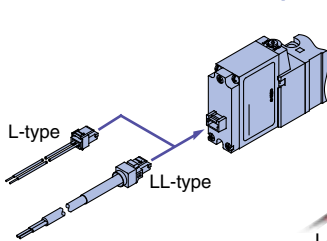
## Flow-rate Characteristics

| Series       |           | Flow-rate characteristics    |      |      |                              |      |      |
|--------------|-----------|------------------------------|------|------|------------------------------|------|------|
|              |           | 1→4/2 (P→A/B)                |      |      | 4/2→5/3 (A/B→EA/EB)          |      |      |
|              |           | C [dm <sup>3</sup> /(s·bar)] | b    | Cv   | C [dm <sup>3</sup> /(s·bar)] | b    | Cv   |
| Body ported  | 53-SY5□20 | 1.9                          | 0.35 | 0.49 | 2.4                          | 0.39 | 0.61 |
|              | 53-SY7□20 | 4.1                          | 0.23 | 0.93 | 3.3                          | 0.33 | 0.81 |
|              | 53-SY9□20 | 7.0                          | 0.33 | 1.7  | 7.6                          | 0.35 | 2.0  |
| Base mounted | 53-SY5□40 | 2.4                          | 0.41 | 0.64 | 2.8                          | 0.29 | 0.66 |
|              | 53-SY7□40 | 4.1                          | 0.41 | 1.1  | 4.1                          | 0.29 | 1.0  |
|              | 53-SY9□40 | 7.9                          | 0.34 | 2.0  | 9.6                          | 0.43 | 2.6  |

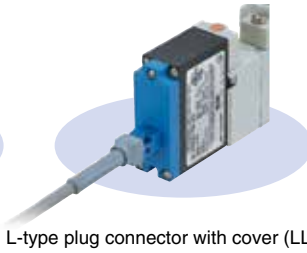
## 3 Types of Connectors

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

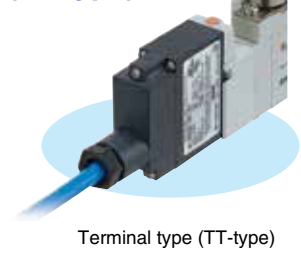
- IP65 compliant (TT-type)



L-type plug connector (L-type)



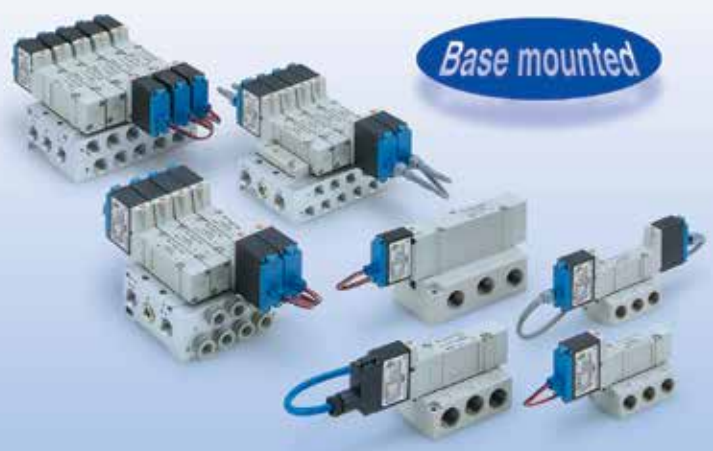
L-type plug connector with cover (LL-type)



Terminal type (TT-type)



Body ported



Base mounted

# Intrinsically Safe Valve

## 5 Port Solenoid Valve

### Series 53-SY5000/7000/9000

## Body Ported

# Single Unit



|                            |                           |
|----------------------------|---------------------------|
| Electrical Entry TT        | Electrical Entry L and LL |
| Hazardous Location         | Hazardous Location        |
| Class I, II, III           | Class I                   |
| Division 1                 | Division 1                |
| Groups A, B, C, D, E, F, G | Groups A, B, C, D         |

**Warning**  
Do not install in Zone 0 (as defined in IEC 60079-10-1: 2008) or Zone 20 (as defined in IEC 60079-10-2: 2009)(Refer to page 40 for details)

### How to Order

53-SY 5 1 20-LL 3 - 01 - -

UL/CSA  
compliant

Series

|   |           |
|---|-----------|
| 5 | 53-SY5000 |
| 7 | 53-SY7000 |
| 9 | 53-SY9000 |

Type of actuation

|           |                                                                                |
|-----------|--------------------------------------------------------------------------------|
| 1         | 2-position single<br>(A) 4 2 (B)<br><br>(EA) 5 1 3 (EB)<br>(P)                 |
| 2         | 2-position double<br>(A) 4 2 (B)<br><br>(EA) 5 1 3 (EB)<br>(P)                 |
| 3 Note 1) | 3-position closed center<br>(A) 4 2 (B)<br><br>(EA) 5 1 3 (EB)<br>(P)          |
| 4 Note 1) | 3-position exhaust center<br>(A) 4 2 (B)<br><br>(EA) 5 1 3 (EB)<br>(P)         |
| 5 Note 1) | 3-position pressure center<br>(A) 4 2 (B)<br><br>(EA) 5 1 3 (EB)<br>(P)        |
| A Note 2) | 4-position dual 3 port valves (N.C./N.C.)<br><br>4(A) 2(B)<br>5(EA) 1(P) 3(EB) |
| B Note 2) | 4-position dual 3 port valves (N.O./N.O.)<br><br>4(A) 2(B)<br>5(EA) 1(P) 3(EB) |
| C Note 2) | 4-position dual 3 port valves (N.C./N.O.)<br><br>4(A) 2(B)<br>5(EA) 1(P) 3(EB) |

Note 1) 3-position type is not available for the 53-SY9000 series.

Note 2) 4-position dual 3 port valves are available for 53-SY5000 only.

### Warning

The solenoid must be connected to a safety barrier located in a non-hazardous area. The safety barrier must meet the specifications listed in the Installation Instructions section.

• A, B port size  
Thread piping

| Symbol | Port size | Applicable series |
|--------|-----------|-------------------|
| 01     | 1/8       | 53-SY5000         |
| 02     | 1/4       | 53-SY7000         |
| 02     | 1/4       | 53-SY9000         |
| 03     | 3/8       |                   |

One-touch fitting (Metric size) <sup>Note)</sup>

| Symbol | Port size             | Applicable series |
|--------|-----------------------|-------------------|
| C4     | ø4 One-touch fitting  | 53-SY5000         |
| C6     | ø6 One-touch fitting  |                   |
| C8     | ø8 One-touch fitting  |                   |
| C8     | ø8 One-touch fitting  | 53-SY7000         |
| C10    | ø10 One-touch fitting |                   |
| C8     | ø8 One-touch fitting  | 53-SY9000         |
| C10    | ø10 One-touch fitting |                   |
| C12    | ø12 One-touch fitting |                   |

One-touch fitting (Inch size) <sup>Note)</sup>

| Symbol | Port size                | Applicable series |
|--------|--------------------------|-------------------|
| N3     | ø5/32" One-touch fitting | 53-SY5000         |
| N7     | ø1/4" One-touch fitting  |                   |
| N9     | ø5/16" One-touch fitting |                   |
| N9     | ø5/16" One-touch fitting | 53-SY7000         |
| N11    | ø3/8" One-touch fitting  |                   |
| N9     | ø5/16" One-touch fitting | 53-SY9000         |
| N11    | ø3/8" One-touch fitting  |                   |

• Manual override

|                                |                                       |                                     |
|--------------------------------|---------------------------------------|-------------------------------------|
| Nil: Non-locking push type<br> | D: Push-turn locking slotted type<br> | E: Push-turn locking lever type<br> |
|--------------------------------|---------------------------------------|-------------------------------------|

• 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             |

• Electrical entry

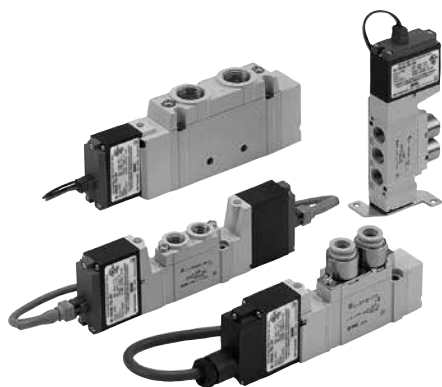
| Symbol              | Electrical entry                     |
|---------------------|--------------------------------------|
| L                   | L-type plug connector<br>            |
| LL                  | L-type plug connector with cover<br> |
| TT <sup>Note)</sup> | Terminal type<br>                    |

Note) The lead wire of TT-type is connected to the terminal block. Use only supplied cable and nut.



# Series 53-SY5000/7000/9000

## Specifications



| Series                                                               |                              | 53-SY5000                                                                           | 53-SY7000 | 53-SY9000 |
|----------------------------------------------------------------------|------------------------------|-------------------------------------------------------------------------------------|-----------|-----------|
| Fluid                                                                |                              | Air                                                                                 |           |           |
| Internal pilot operating pressure range                              | 2-position single            | 0.15 to 0.7 MPa (20 to 100 psi)                                                     |           |           |
|                                                                      | 4-position dual 3 port valve |                                                                                     |           |           |
|                                                                      | 2-position double            |                                                                                     |           |           |
|                                                                      | 3-position                   | 0.2 to 0.7 MPa (30 to 100 psi)                                                      |           |           |
|                                                                      |                              |                                                                                     |           |           |
| Ambient and fluid temperature                                        |                              | -10 to 50°C (15 to 120°F) (No freezing)                                             |           |           |
| Max. operating frequency (Hz)                                        | 2-position single, double    | 1                                                                                   |           |           |
|                                                                      | 4-position dual 3 port valve |                                                                                     |           |           |
|                                                                      | 3-position                   |                                                                                     |           |           |
| Manual override (Manual operation)                                   |                              | Non-locking push type, Push-turn locking slotted type, Push-turn locking lever type |           |           |
| Pilot exhaust method                                                 |                              | Main/Pilot valve common exhaust                                                     |           |           |
| Lubrication                                                          |                              | Not required                                                                        |           |           |
| Mounting orientation                                                 |                              | Unrestricted                                                                        |           |           |
| Impact/Vibration resistance (m/s <sup>2</sup> ) <small>Note)</small> |                              | 150/30                                                                              |           |           |
| Enclosure                                                            |                              | IP30 (L-type), IP40 (LL-type), IP65 (TT-type)                                       |           |           |

\* Based on IEC 60529

**Note)** Impact resistance: No malfunction occurred when tested in the axial direction and at the right angles to the main valve and armature in both energized and de-energized states.

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

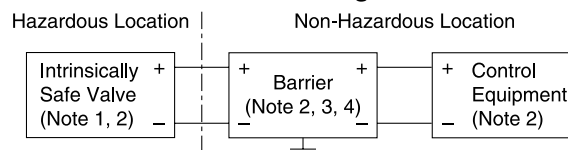
### Warning

To insure intrinsic safety, the valve is to be installed in an impact and vibration free environment.

## Warning

### Installation Instructions

#### Installation Diagram



- This product must be connected in accordance with the +/- polarity indication.
- This product must be connected to a certified intrinsically safe circuit (e.g. Zener barrier) for apparatus group IIC with the following maximum values:  
 $U_i = 28\text{ V}$     $I_i = 225\text{ mA}$  (resistively limited)  
 $P_i = 1\text{ W}$     $C_i = 0\text{ nF}$     $L_i = 0\text{ mH}$   
 Confirm the solenoid input voltage at the lead wires is  $12\text{ VDC} \pm 10\%$ .  
 The resistance of the solenoid valve is  $R_{20} + 278 \pm 3\%$  Ohm at  $20^\circ\text{C}$ .
- Do not bend or pull cables repeatedly.

### Warning

**Note)**

- Control equipment connected to the barrier must not use or generate more than 250 V.
- Installation should be in accordance with Canadian Electrical Code or ANSI/ISA RP12.6 "Installation of Intrinsically Safe Systems for Hazardous (Classified) Locations" and the National Electrical Code or ANSI/NFPA 70.
- Barrier manufacturer's installation drawing must be followed when installing this equipment.
- Multiple barriers are not to be used in parallel unless specifically permitted by the barrier certification.

To insure that intrinsically safe criteria are met, use the below parameters to determine the appropriate barrier.

**Note)** C<sub>cable</sub> and L<sub>cable</sub> represents the capacitance and inductance of wire added by the consumer from the intrinsically safe equipment to the barrier. C<sub>cable</sub> and L<sub>cable</sub> values must be used in the system calculations.

| I.S. Equipment    |        | Barrier              |
|-------------------|--------|----------------------|
| $U_i$             | $\geq$ | $U_o$ (or $V_{oc}$ ) |
| $I_i$             | $\geq$ | $I_o$ (or $I_{sc}$ ) |
| $P_i$             | $\geq$ | $P_o$                |
| $C_i + C_{cable}$ | $\leq$ | $C_o$ (or $C_a$ )    |
| $L_i + L_{cable}$ | $\leq$ | $L_o$ (or $L_a$ )    |

If the cable capacitance and inductance are unknown, use the following values:  
 $C_{cable} = 60\text{ pF/ft.}$ ,  $L_{cable} = 0.2\text{ }\mu\text{H/ft.}$

If the barrier  $P_o$  is unknown, it may be calculated using the formula  $P_o = (U_o \times I_o)/4$  or  $(V_{oc} \times I_{sc})/4$ .

## Solenoid Specifications

|                               |                                                                                          |
|-------------------------------|------------------------------------------------------------------------------------------|
| Electrical entry              | Terminal type (TT)<br>L-type plug connector (L)<br>L-type plug connector with cover (LL) |
| Coil rated voltage            | 12 VDC                                                                                   |
| Power consumption             | 0.52 W (at rated voltage)                                                                |
| Allowable voltage fluctuation | -10% to +10% of rate voltage                                                             |
| Temperature class             | T4<br>Maximum surface temperature $135^\circ\text{C}$ ( $275^\circ\text{F}$ )            |

## Hazardous Locations Specifications

|                     |                                                              |                                                          |
|---------------------|--------------------------------------------------------------|----------------------------------------------------------|
| Electrical entry    | Terminal type (TT)                                           | L-type plug connector (L)<br>LL-type plug connector (LL) |
| Hazardous Locations | Class I, II, III<br>Division 1<br>Groups A, B, C, D, E, F, G | Class I<br>Division 1<br>Groups A, B, C, D               |

**Note)** **Warning** Do not install in Zone 0 (as defined in IEC 60079-10-1: 2008) or Zone 20 (as defined in IEC 60079-10-2: 2009) (Refer to page 40 for details)

## Response Time

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

| Type of actuation            | Response time (ms) (at 0.5 MPa) <small>Note)</small> |            |            |
|------------------------------|------------------------------------------------------|------------|------------|
|                              | 53-SY5000                                            | 53-SY7000  | 53-SY9000  |
| 2-position single            | 26 or less                                           | 38 or less | 50 or less |
| 2-position double            | 22 or less                                           | 30 or less | 50 or less |
| 3-position                   | 38 or less                                           | 56 or less | —          |
| 4-position dual 3 port valve | 24 or less                                           | —          | —          |

**Note)** Response time may be longer depending on the specification of barrier.

## Flow-rate Characteristics

### Series 53-SY5000

| Valve model            | Type of actuation      |                 | Port size                       |                                 | Flow-rate characteristics <sup>Note)</sup> |             |             |                     |             |             |
|------------------------|------------------------|-----------------|---------------------------------|---------------------------------|--------------------------------------------|-------------|-------------|---------------------|-------------|-------------|
|                        |                        |                 | 1, 5, 3<br>(P, EA, EB)          | 4, 2<br>(A, B)                  | 1→4/2 (P→A/B)                              |             |             | 4/2→5/3 (A/B→EA/EB) |             |             |
|                        |                        |                 |                                 |                                 | C [dm³/s·bar]                              | b           | Cv          | C [dm³/s·bar]       | b           | Cv          |
| 53-SY5<br>□20-□<br>-01 | 2-position             | Single          | 1/8                             | 1/8                             | 1.9                                        | 0.35        | 0.49        | 2.4                 | 0.39        | 0.61        |
|                        |                        | Double          |                                 |                                 | 1.7                                        | 0.43        | 0.45        | 1.8                 | 0.35        | 0.46        |
|                        | 3-position             | Closed center   |                                 |                                 | 1.5                                        | 0.44        | 0.41        | 2.5 [1.5]           | 0.32 [0.43] | 0.59 [0.40] |
|                        |                        | Exhaust center  |                                 |                                 | 2.2 [0.91]                                 | 0.46 [0.58] | 0.61 [0.28] | 1.8                 | 0.38        | 0.46        |
|                        |                        | Pressure center |                                 |                                 | 1.5                                        | 0.33        | 0.46        | 1.7                 | 0.34        | 0.51        |
|                        | 4-position dual 3 port | N.C./N.C.       |                                 |                                 | 1.5                                        | 0.41        | 0.48        | 1.5                 | 0.28        | 0.42        |
|                        |                        | N.O./N.O.       |                                 |                                 |                                            |             |             |                     |             |             |
| 53-SY5<br>□20-□<br>-C4 | 2-position             | Single          |                                 | C4<br>ø4<br>(One-touch fitting) | 0.75                                       | 0.43        | 0.20        | 0.85                | 0.64        | 0.30        |
|                        |                        | Double          |                                 |                                 | 0.74                                       | 0.40        | 0.19        | 0.84                | 0.57        | 0.28        |
|                        | 3-position             | Closed center   |                                 |                                 | 0.75                                       | 0.36        | 0.19        | 0.84 [0.84]         | 0.64 [0.53] | 0.30 [0.27] |
|                        |                        | Exhaust center  |                                 |                                 | 0.78 [0.71]                                | 0.44 [0.37] | 0.21 [0.18] | 0.84                | 0.57        | 0.27        |
|                        |                        | Pressure center |                                 |                                 | 0.7                                        | 0.52        | 0.24        | 0.7                 | 0.54        | 0.27        |
|                        | 4-position dual 3 port | N.C./N.C.       |                                 |                                 | 0.7                                        | 0.51        | 0.26        | 0.7                 | 0.51        | 0.23        |
|                        |                        | N.O./N.O.       |                                 |                                 |                                            |             |             |                     |             |             |
| 53-SY5<br>□20-□<br>-C6 | 2-position             | Single          | C6<br>ø6<br>(One-touch fitting) | 1.5                             | 0.33                                       | 0.33        | 2.0         | 0.37                | 0.52        |             |
|                        |                        | Double          |                                 | 1.3                             | 0.31                                       | 0.33        | 1.6         | 0.32                | 0.39        |             |
|                        | 3-position             | Closed center   |                                 | 1.3                             | 0.33                                       | 0.33        | 1.8 [1.4]   | 0.35 [0.37]         | 0.44 [0.35] |             |
|                        |                        | Exhaust center  |                                 | 1.7 [0.80]                      | 0.31 [0.47]                                | 0.42 [0.23] | 1.7         | 0.33                | 0.44        |             |
|                        |                        | Pressure center |                                 | 1.3                             | 0.37                                       | 0.38        | 1.5         | 0.30                | 0.43        |             |
|                        | 4-position dual 3 port | N.C./N.C.       |                                 | 1.3                             | 0.37                                       | 0.40        | 1.3         | 0.24                | 0.36        |             |
|                        |                        | N.O./N.O.       |                                 |                                 |                                            |             |             |                     |             |             |
| 53-SY5<br>□20-□<br>-C8 | 2-position             | Single          | C8<br>ø8<br>(One-touch fitting) | 1.9                             | 0.21                                       | 0.45        | 2.3         | 0.29                | 0.57        |             |
|                        |                        | Double          |                                 | 1.6                             | 0.29                                       | 0.39        | 1.7         | 0.38                | 0.46        |             |
|                        | 3-position             | Closed center   |                                 | 1.4                             | 0.38                                       | 0.39        | 2.0 [1.5]   | 0.37 [0.41]         | 0.52 [0.43] |             |
|                        |                        | Exhaust center  |                                 | 2.2 [1.6]                       | 0.32 [0.44]                                | 0.56 [0.44] | 1.8         | 0.41                | 0.50        |             |
|                        |                        | Pressure center |                                 | 1.5                             | 0.28                                       | 0.44        | 1.7         | 0.33                | 0.50        |             |
|                        | 4-position dual 3 port | N.C./N.C.       |                                 | 1.4                             | 0.39                                       | 0.46        | 1.4         | 0.28                | 0.40        |             |
|                        |                        | N.O./N.O.       |                                 |                                 |                                            |             |             |                     |             |             |

Note) [ ] : Indicates normal position

### Series 53-SY7000

| Valve model             | Type of actuation |                 | Port size              |                                      | Flow-rate characteristics <sup>Note)</sup> |                |                |                     |                |                |      |
|-------------------------|-------------------|-----------------|------------------------|--------------------------------------|--------------------------------------------|----------------|----------------|---------------------|----------------|----------------|------|
|                         |                   |                 | 1, 5, 3<br>(P, EA, EB) | 4, 2<br>(A, B)                       | 1→4/2 (P→A/B)                              |                |                | 4/2→5/3 (A/B→EA/EB) |                |                |      |
|                         |                   |                 |                        |                                      | C [dm³/<br>(s·bar)]                        | b              | Cv             | C [dm³/<br>(s·bar)] | b              | Cv             |      |
| 53-SY7<br>□20-□<br>-02  | 2-position        | Single          | 1 (P)<br>port 1/4      | 1/4                                  | 4.1                                        | 0.23           | 0.93           | 3.3                 | 0.33           | 0.81           |      |
|                         |                   | Double          |                        |                                      | 2.9                                        | 0.31           | 0.70           | 2.4                 | 0.38           | 0.63           |      |
|                         | 3-position        | Closed center   |                        |                                      | 2.5                                        | 0.39           | 0.65           | 3.4<br>[2.1]        | 0.35<br>[0.38] | 0.82<br>[0.54] |      |
|                         |                   | Exhaust center  |                        |                                      | 4.3<br>[2.4]                               | 0.23<br>[0.32] | 0.97<br>[0.61] | 2.2                 | 0.39           | 0.58           |      |
|                         |                   | Pressure center |                        |                                      | 3.2                                        | 0.26           | 0.77           | 3.2                 | 0.37           | 0.82           |      |
| 53-SY7<br>□20-□<br>-C8  | 2-position        | Single          |                        |                                      | C8<br>(ø8<br>One-touch<br>fitting)         | 3.2            | 0.26           | 0.77                | 3.2            | 0.37           | 0.82 |
|                         |                   | Double          |                        |                                      |                                            | 2.6            | 0.24           | 0.63                | 2.4            | 0.31           | 0.62 |
|                         | 3-position        | Closed center   |                        | 2.4                                  |                                            | 0.25           | 0.57           | 2.6<br>[1.9]        | 0.42<br>[0.46] | 0.70<br>[0.56] |      |
|                         |                   | Exhaust center  |                        | 3.3<br>[2.4]                         |                                            | 0.28<br>[0.22] | 0.78<br>[0.57] | 2.2                 | 0.34           | 0.60           |      |
|                         |                   | Pressure center |                        | 3.8                                  |                                            | 0.26           | 0.86           | 3.2                 | 0.34           | 0.82           |      |
| 53-SY7<br>□20-□<br>-C10 | 2-position        | Single          |                        | C10<br>(ø10<br>One-touch<br>fitting) |                                            | 3.8            | 0.26           | 0.86                | 3.2            | 0.34           | 0.82 |
|                         |                   | Double          |                        |                                      |                                            | 2.8            | 0.27           | 0.67                | 2.4            | 0.21           | 0.59 |
|                         | 3-position        | Closed center   | 2.5                    |                                      | 0.25                                       | 0.59           | 2.7<br>[2.0]   | 0.38<br>[0.38]      | 0.70<br>[0.56] |                |      |
|                         |                   | Exhaust center  | 3.8<br>[2.4]           |                                      | 0.25<br>[0.31]                             | 0.89<br>[0.61] | 2.3            | 0.38                | 0.61           |                |      |
|                         |                   | Pressure center |                        |                                      |                                            |                |                |                     |                |                |      |

Note) [ ] : Indicates normal position

### Series 53-SY9000

| Valve model             | Type of actuation |        | Port size              |                                 | Flow-rate characteristics  |      |      |                            |      |     |
|-------------------------|-------------------|--------|------------------------|---------------------------------|----------------------------|------|------|----------------------------|------|-----|
|                         |                   |        | 1, 5, 3<br>(P, EA, EB) | 4, 2<br>(A, B)                  | 1→4/2 (P→A/B)              |      |      | 4/2→5/3 (A/B→EA/EB)        |      |     |
|                         |                   |        |                        |                                 | C [dm <sup>3</sup> /s-bar] | b    | Cv   | C [dm <sup>3</sup> /s-bar] | b    | Cv  |
| 53-SY9<br>□20-□<br>-02  | 2-position        | Single | 1/4                    | 1/4                             | 7.0                        | 0.33 | 1.7  | 7.6                        | 0.35 | 2.0 |
|                         |                   | Double |                        |                                 |                            |      |      |                            |      |     |
| 53-SY9<br>□20-□<br>-03  | 2-position        | Single |                        | 3/8                             | 8.0                        | 0.29 | 1.9  | 8.0                        | 0.33 | 2.0 |
|                         |                   | Double |                        |                                 |                            |      |      |                            |      |     |
| 53-SY9<br>□20-□<br>-C8  | 2-position        | Single |                        | C8<br>ø8<br>One-touch fitting   | 4.3                        | 0.28 | 0.96 | 7.1                        | 0.32 | 1.7 |
|                         |                   | Double |                        |                                 |                            |      |      |                            |      |     |
| 53-SY9<br>□20-□<br>-C10 | 2-position        | Single |                        | C10<br>ø10<br>One-touch fitting | 6.1                        | 0.28 | 1.4  | 7.9                        | 0.33 | 1.9 |
|                         |                   | Double |                        |                                 |                            |      |      |                            |      |     |
| 53-SY9<br>□20-□<br>-C12 | 2-position        | Single |                        | C12<br>ø12<br>One-touch fitting | 7.0                        | 0.25 | 1.6  | 8.6                        | 0.41 | 2.2 |
|                         |                   | Double |                        |                                 |                            |      |      |                            |      |     |

# Series 53-SY5000/7000/9000

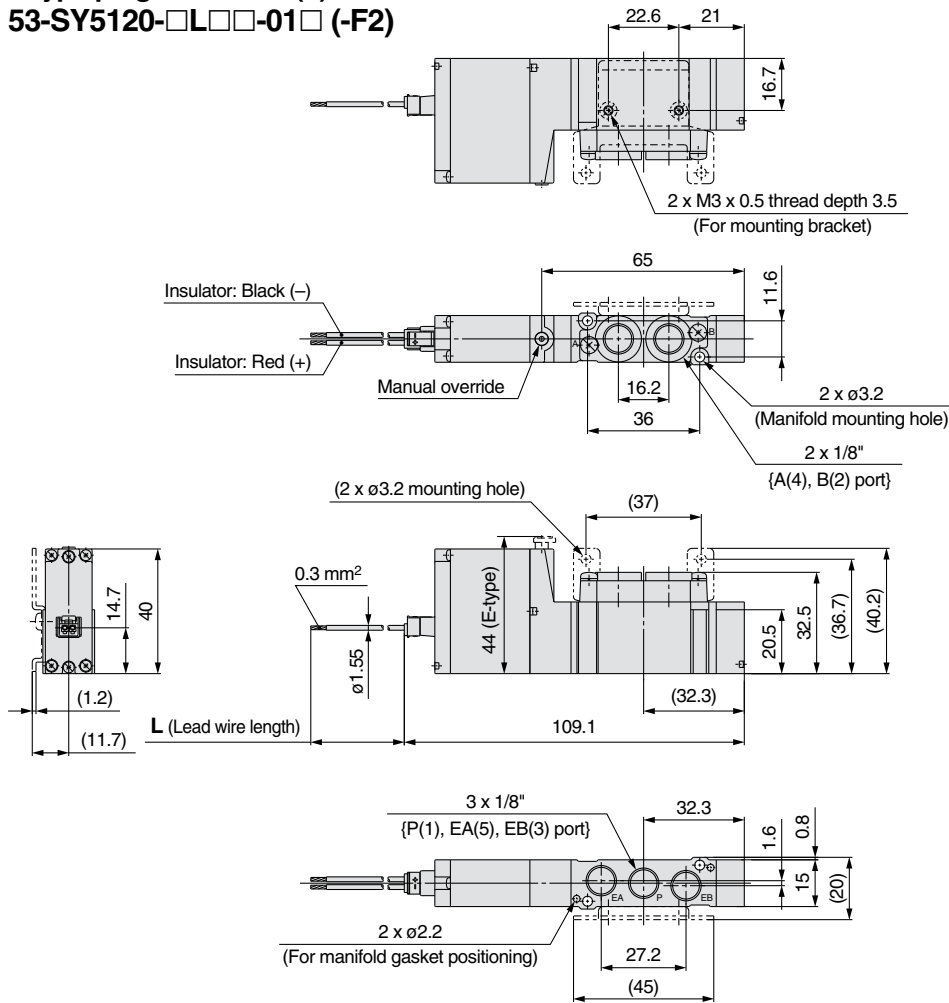
## Dimensions: 53-SY5000

(mm)

### 2-position single

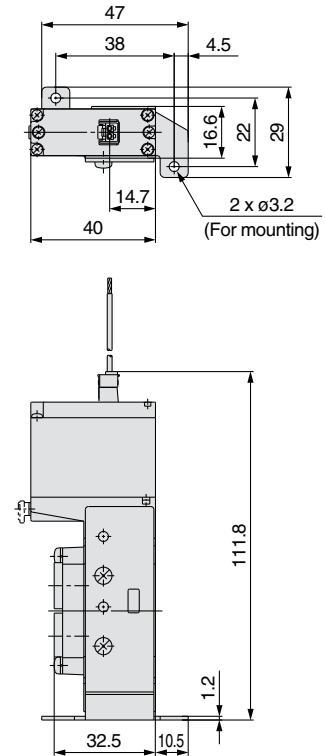
### L-type plug connector (L)

### 53-SY5120-□L□□-01□ (-F2)



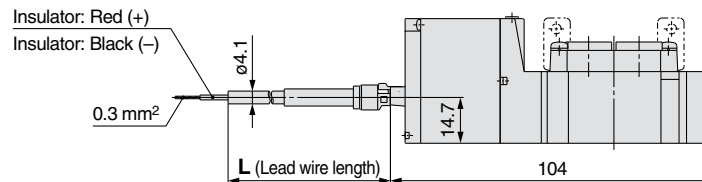
### With foot bracket

### 53-SY5120-□L□□-01□-F1



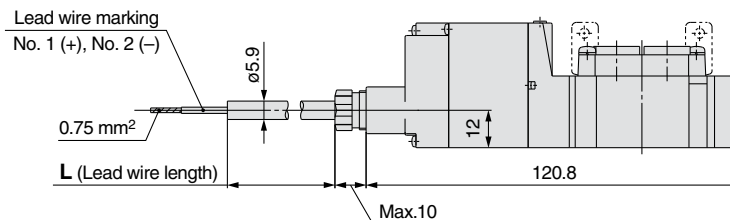
### L-type plug connector with cover (LL)

### 53-SY5120-□LL□□-01□ (-F2)



### Terminal type (TT)

### 53-SY5120-□TT□□-01□ (-F2)



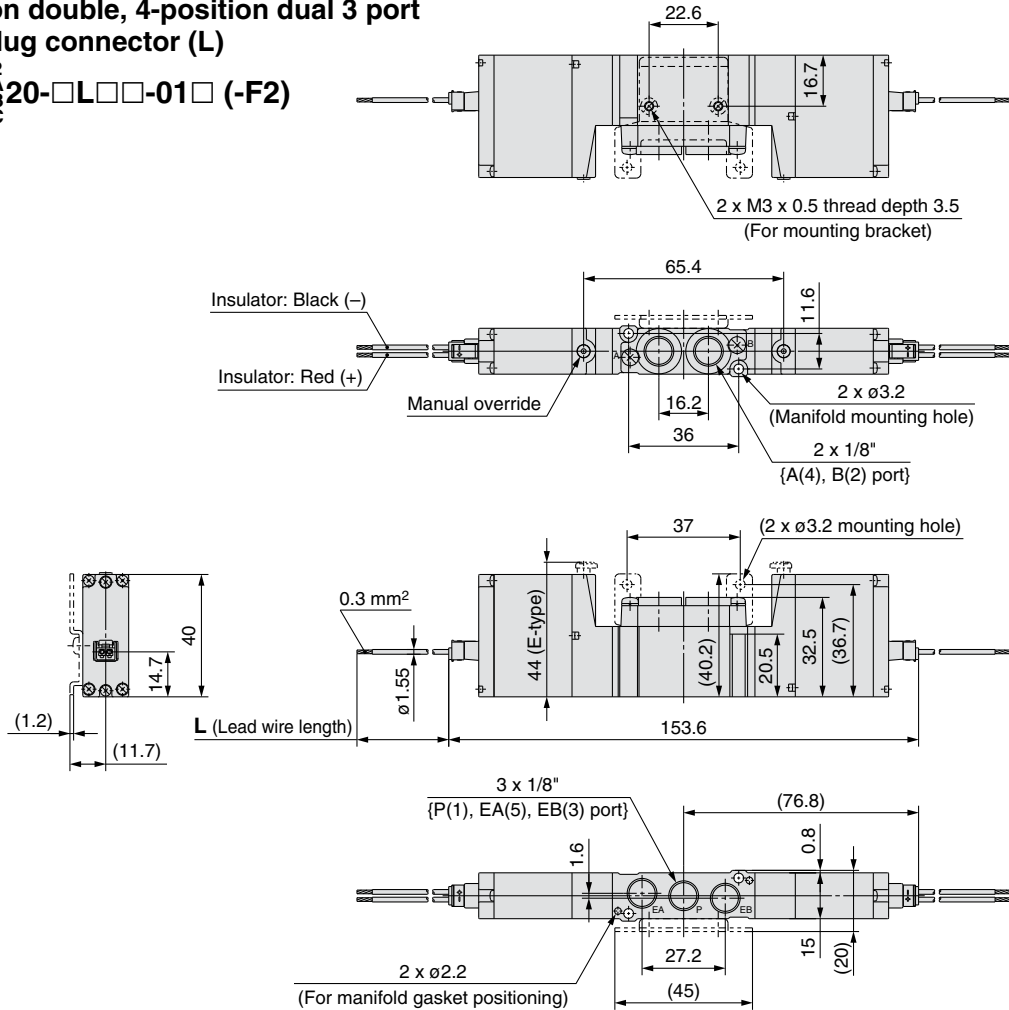
# Body Ported **Series 53-SY5000/7000/9000**

## Dimensions: 53-SY5000

(mm)

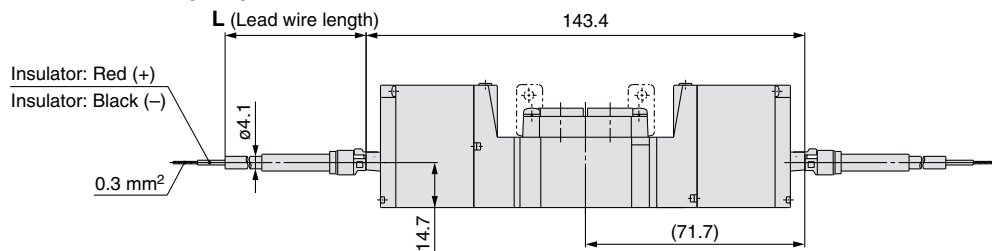
2-position double, 4-position dual 3 port  
L-type plug connector (L)

53-SY5<sup>2</sup><sub>A</sub>20-□L□□-01□ (-F2)  
C



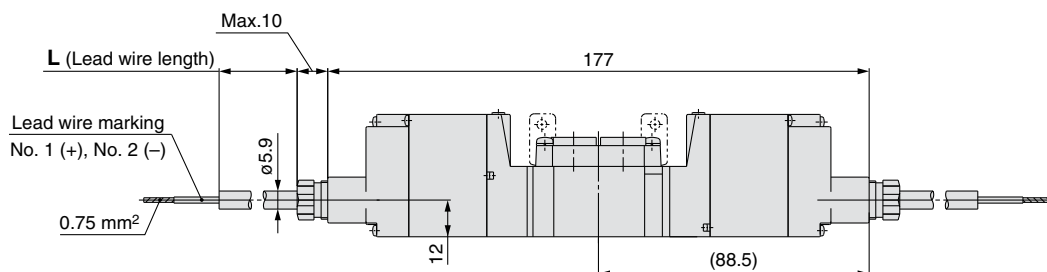
L-type plug connector with cover (LL)

53-SY5<sup>2</sup><sub>A</sub>20-□LL□□-01□ (-F2)  
C



Terminal type (TT)

53-SY5<sup>2</sup><sub>A</sub>20-□TT□□-01□ (-F2)  
C



# Series 53-SY5000/7000/9000

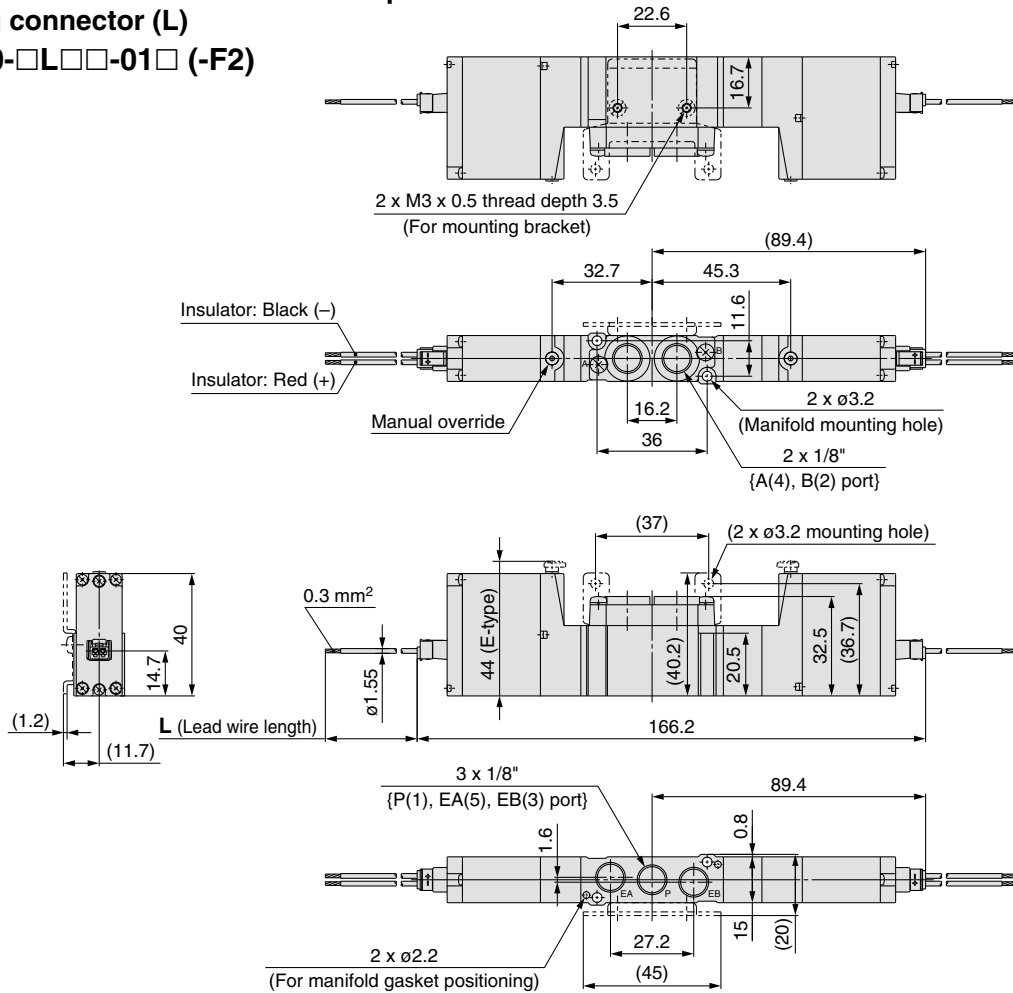
## Dimensions: 53-SY5000

(mm)

3-position closed center/exhaust center/pressure center

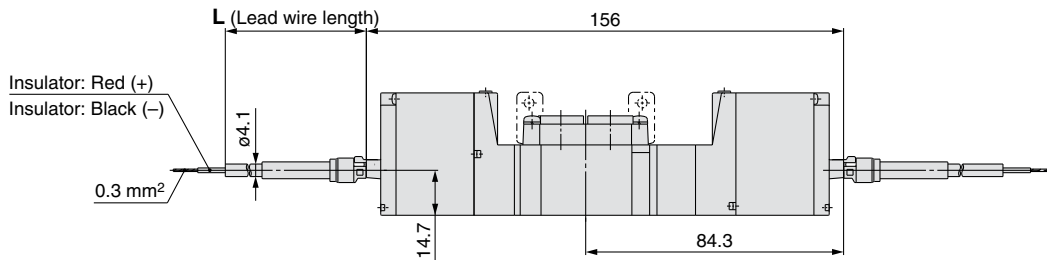
L-type plug connector (L)

53-SY5<sup>3</sup>/<sub>4</sub>20-□L□□-01□ (-F2)



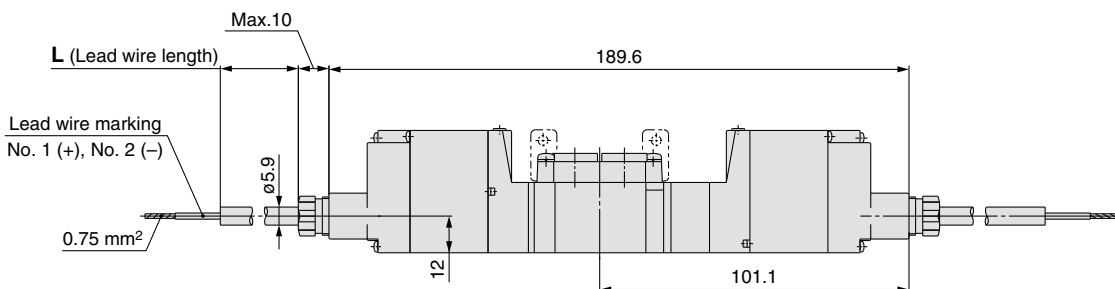
L-type plug connector with cover (LL)

53-SY5<sup>3</sup>/<sub>4</sub>20-□LL□□-01□ (-F2)



Terminal type (TT)

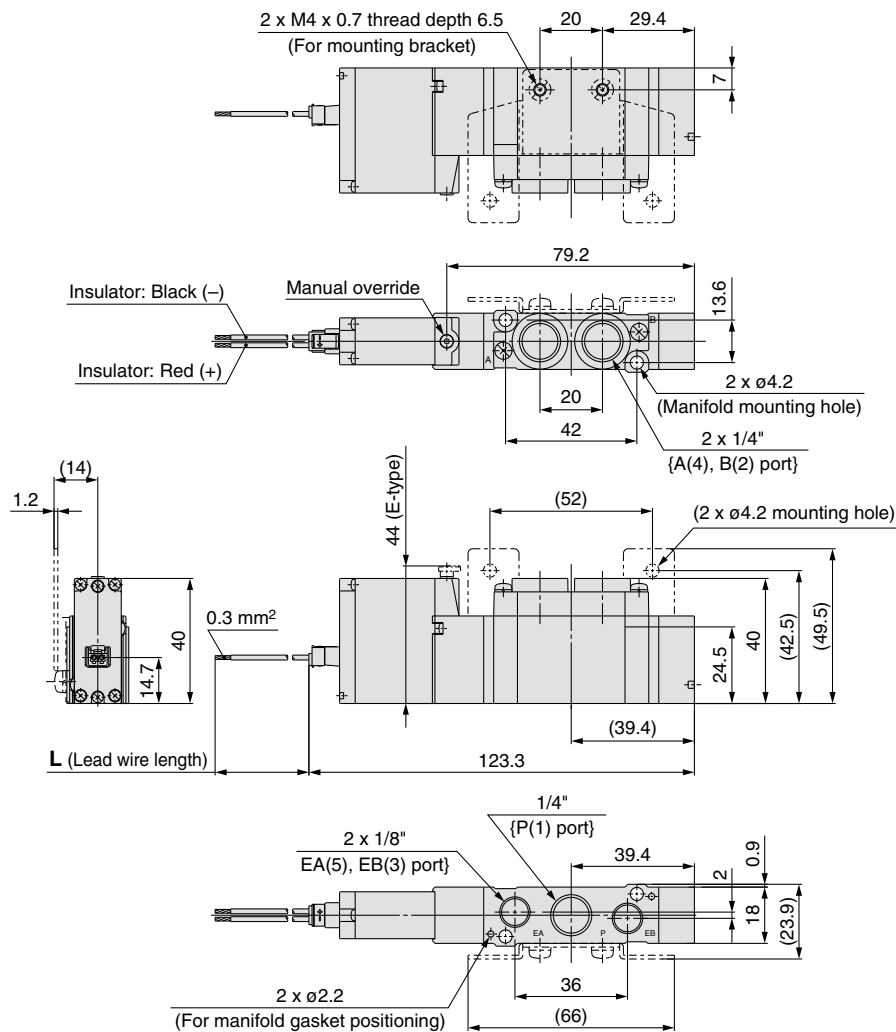
53-SY5<sup>3</sup>/<sub>4</sub>20-□TT□□-01□ (-F2)



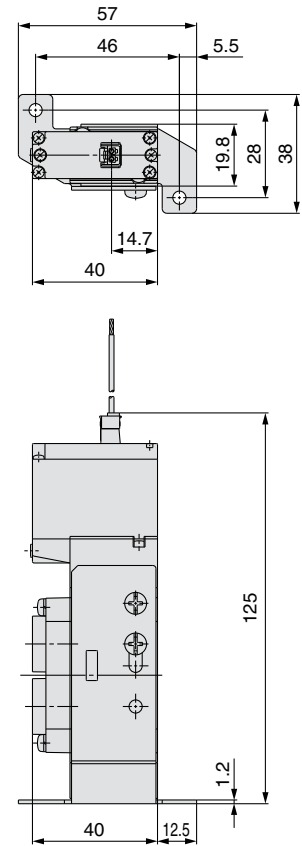
## Dimensions: 53-SY7000

(mm)

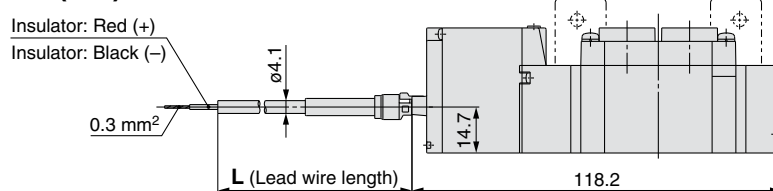
### 2-position single L-type plug connector (L) 53-SY7120-□L□□-02□ (-F2)



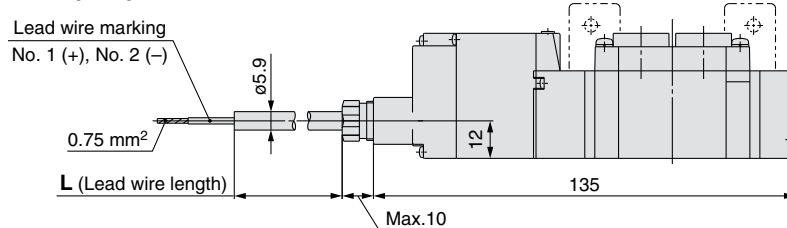
### With foot bracket 53-SY7120-□L□□-02□-F1



### L-type plug connector with cover (LL) 53-SY7120-□LL□□-02□ (-F2)



### Terminal type (TT) 53-SY7120-□TT□□-02□ (-F2)



## Series 53-SY5000/7000/9000

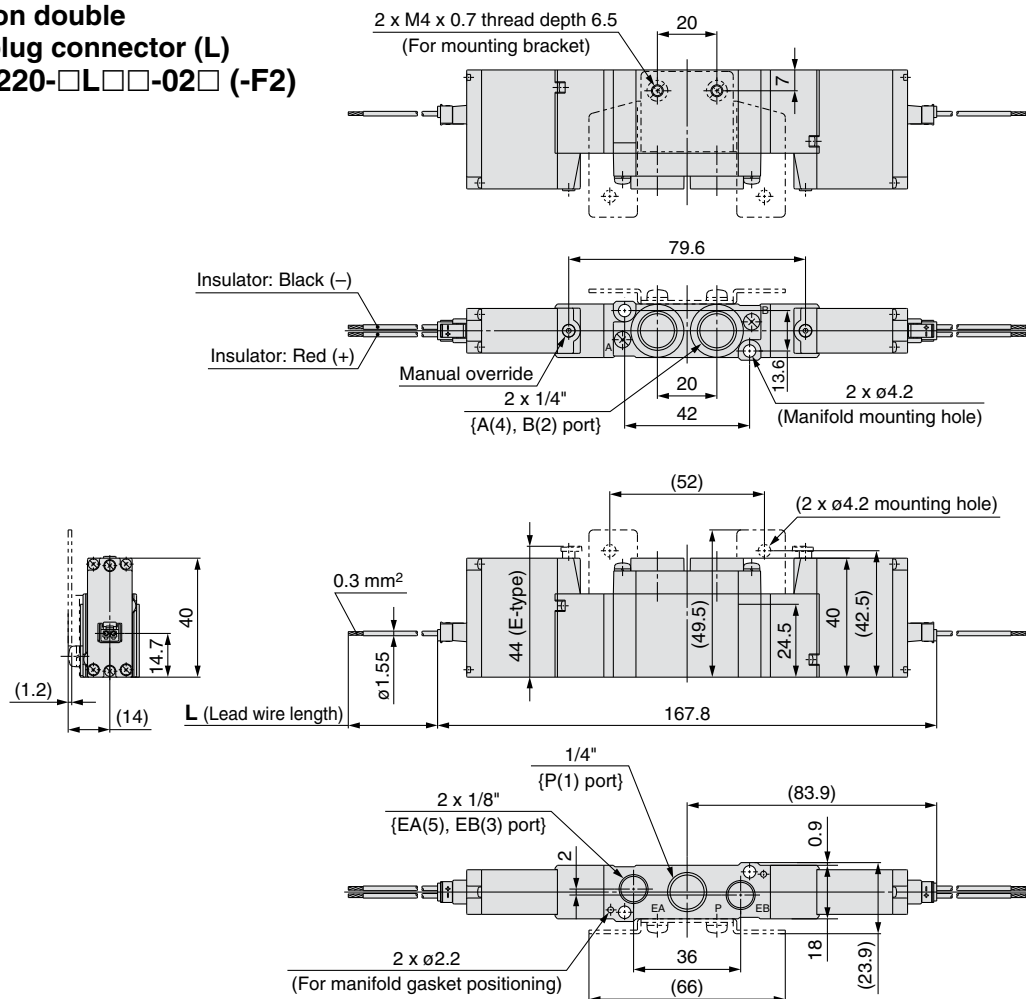
## Dimensions: 53-SY7000

(mm)

## 2-position double

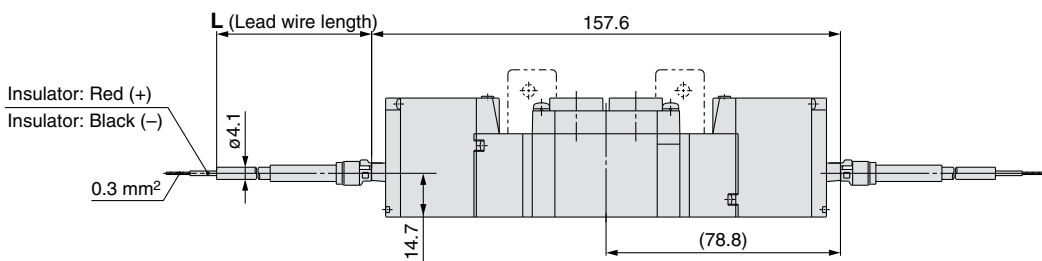
### L-type plug connector (L)

**53-SY7220-□L□□-02□ (-F2)**



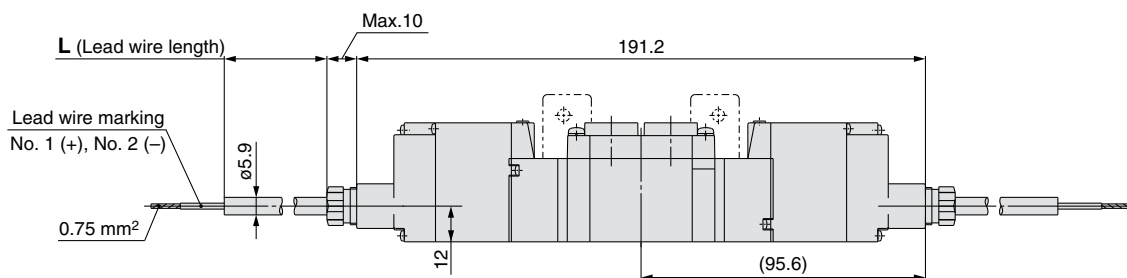
### L-type plug connector with cover (LL)

53-SY7220-□LL□□-02□ (-F2)



### Terminal type (TT)

**53-SY7220-□TT□□-02□ (-F2)**



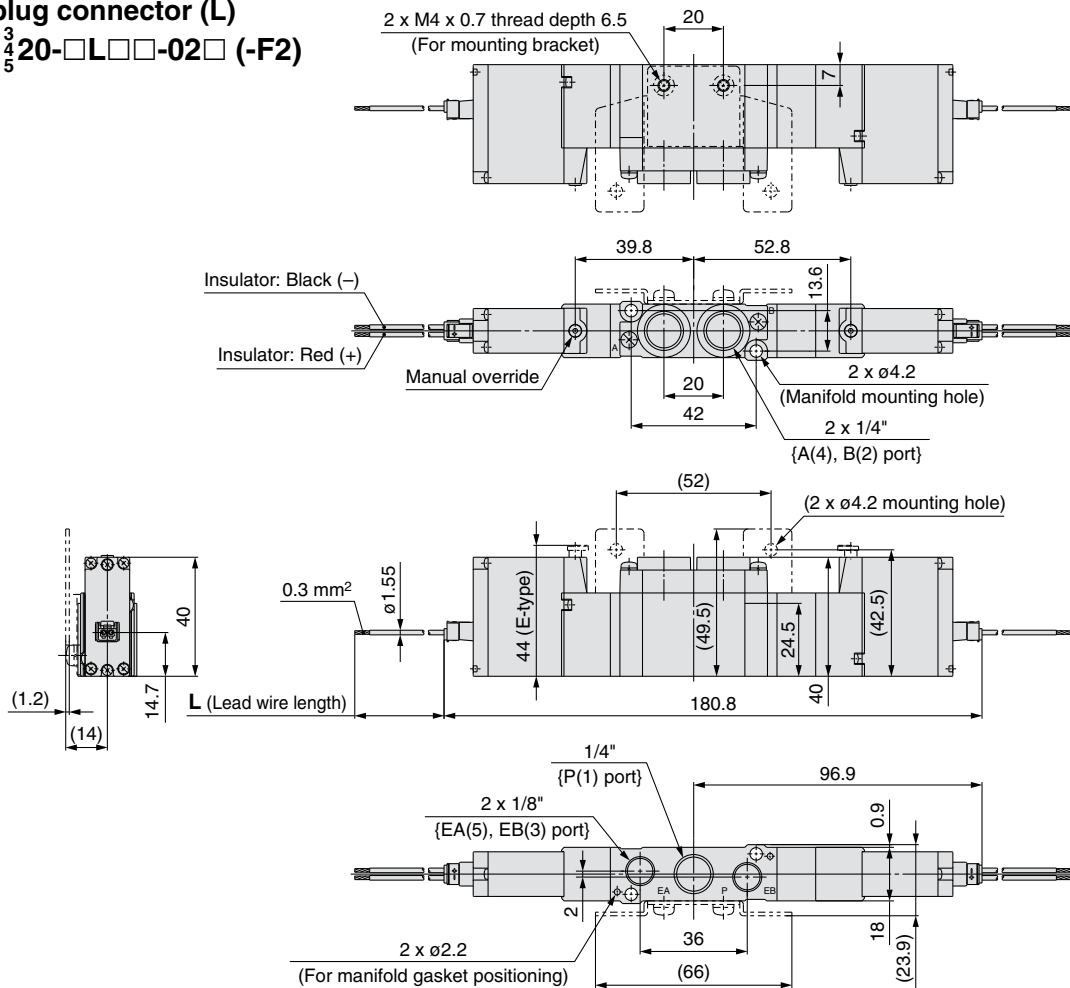
### Dimensions: 53-SY7000

(mm)

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

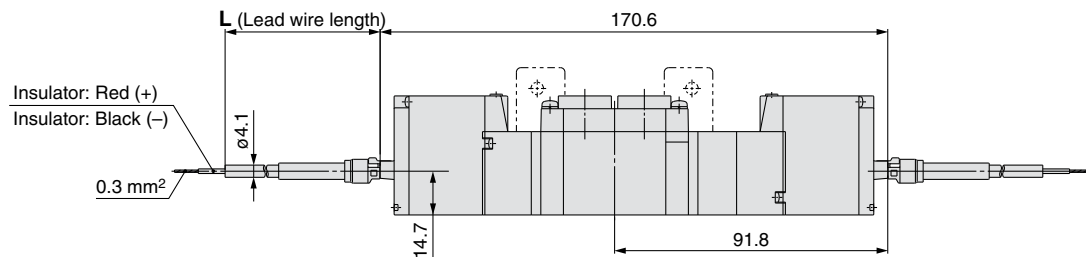
### L-type plug connector (L)

**53-SY7<sup>3</sup><sub>4</sub><sub>5</sub>20-□L□□-02□ (-F2)**



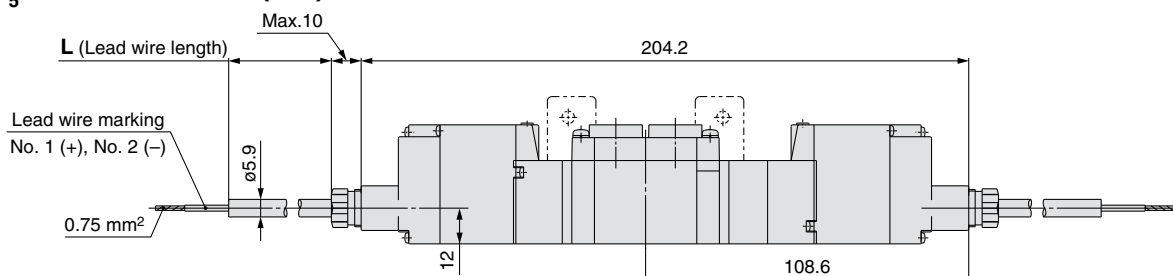
### L-type plug connector with cover (LL)

**53-SY7<sub>4</sub><sup>3</sup>20-□LL□□-02□ (-F2)**



### Terminal type (TT)

**53-SY7<sup>3</sup><sub>4</sub><sub>5</sub>20-□TT□□-02□ (-F2)**



# Series 53-SY5000/7000/9000

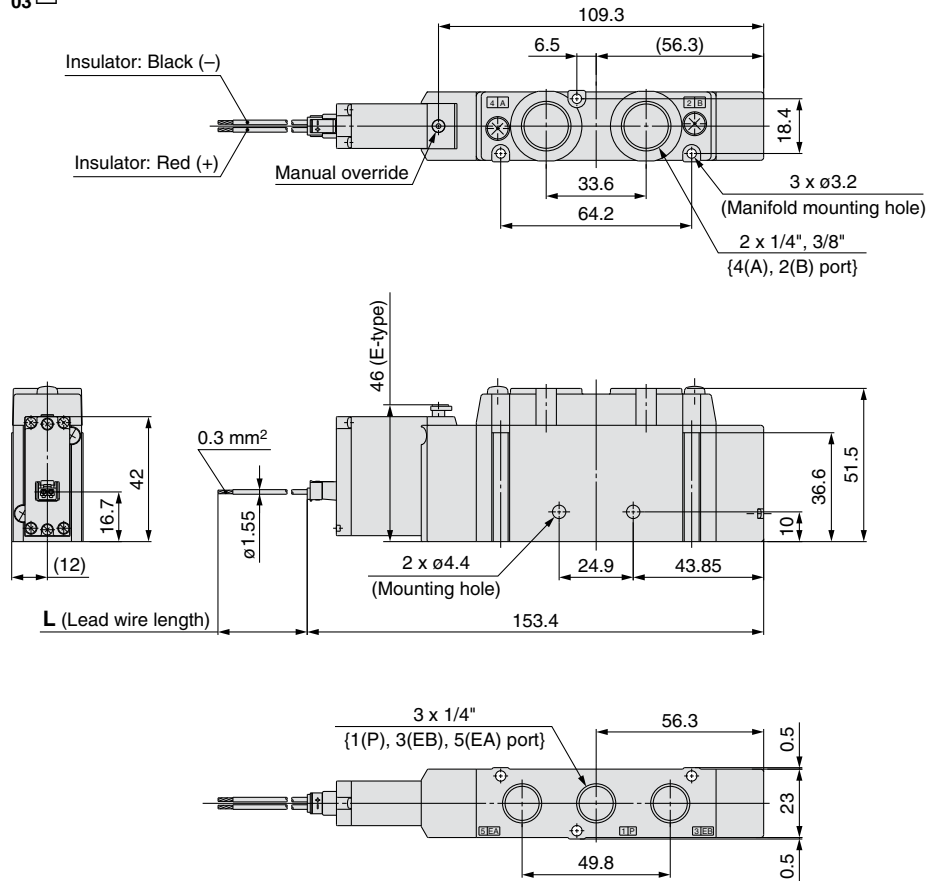
## Dimensions: 53-SY9000

(mm)

### 2-position single

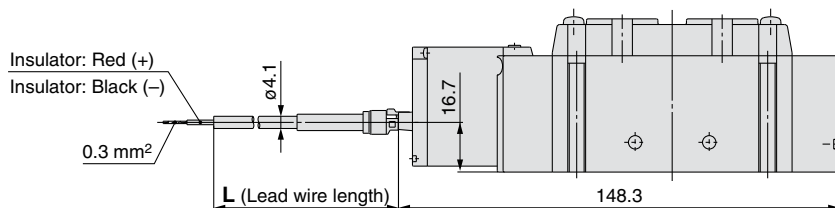
#### L-type plug connector (L)

53-SY9120-□L□□-<sup>02</sup><sub>03</sub>□



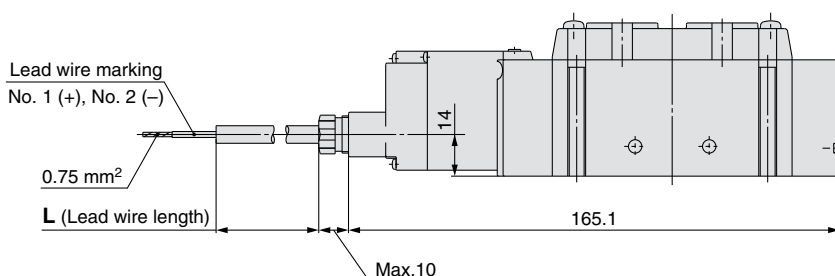
### L-type plug connector with cover (LL)

53-SY9120-□LL□□-<sup>02</sup><sub>03</sub>□



### Terminal type (TT)

53-SY9120-□TT□□-<sup>02</sup><sub>03</sub>□



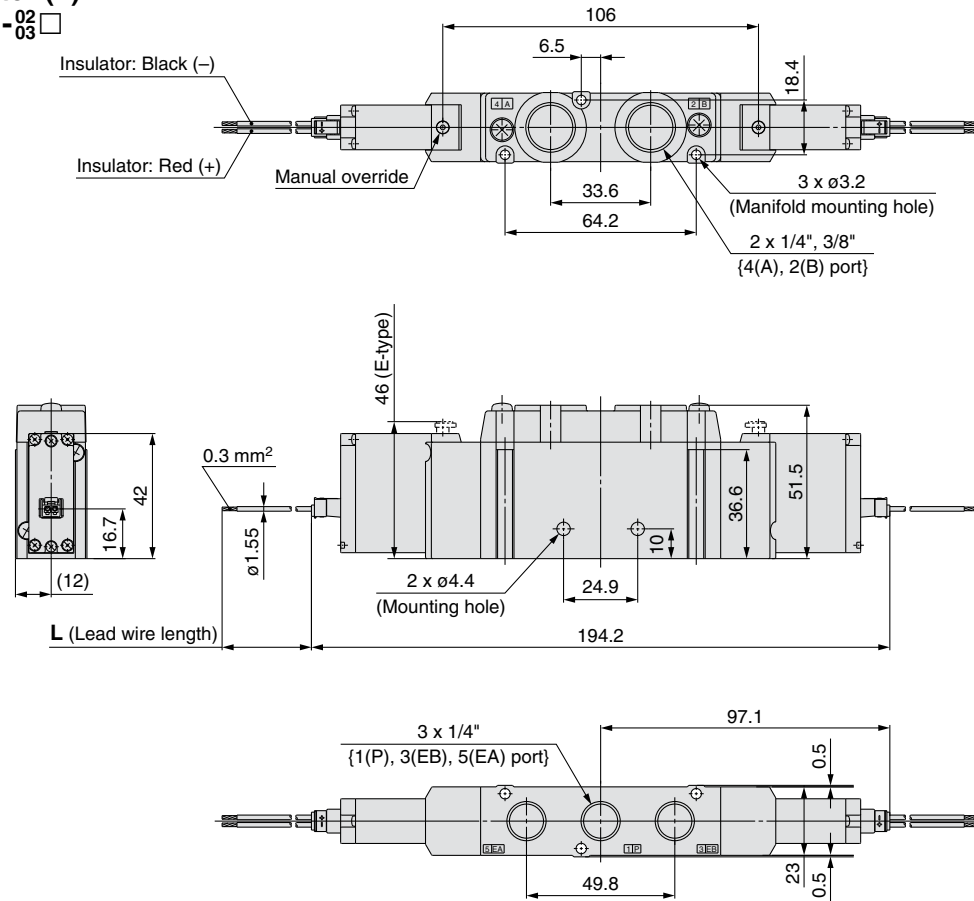
## Dimensions: 53-SY9000

(mm)

### 2-position double

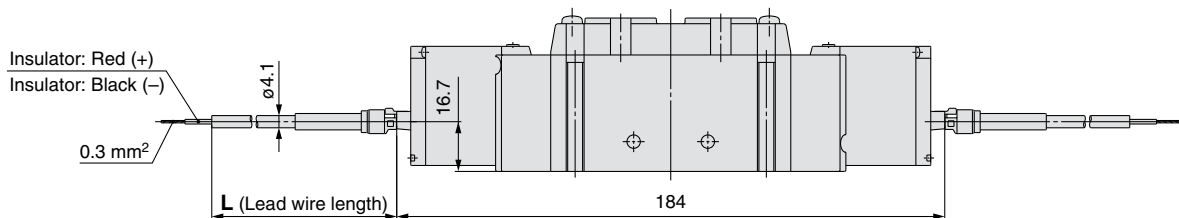
### L-type plug connector (L)

53-SY9220-□L□□-<sup>02</sup><sub>03</sub>□



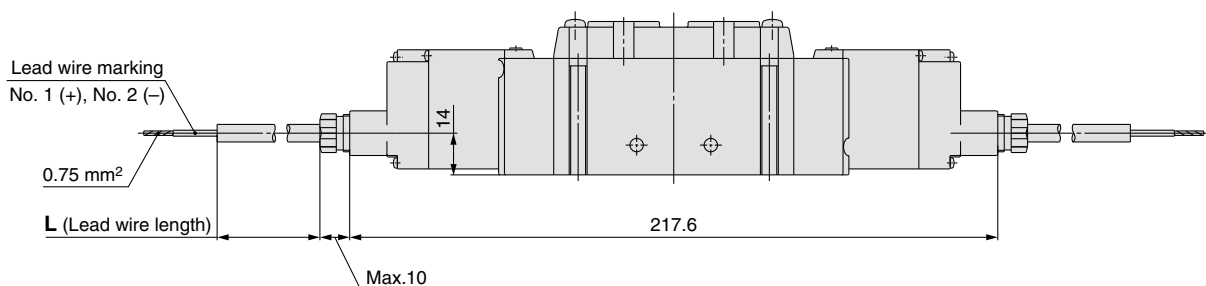
### L-type plug connector with cover (LL)

53-SY9220-□LL□□-<sup>02</sup><sub>03</sub>□



### Terminal type (TT)

53-SY9220-□TT□□-<sup>02</sup><sub>03</sub>□



# Intrinsically Safe Valve 5 Port Solenoid Valve Series 53-SY5000/7000/9000 Base Mounted Single Unit



|                                                                                                           |                                                                                               |
|-----------------------------------------------------------------------------------------------------------|-----------------------------------------------------------------------------------------------|
| Electrical Entry TT<br>Hazardous Location<br>Class I, II, III<br>Division 1<br>Groups A, B, C, D, E, F, G | Electrical Entry L and LL<br>Hazardous Location<br>Class I<br>Division 1<br>Groups A, B, C, D |
|-----------------------------------------------------------------------------------------------------------|-----------------------------------------------------------------------------------------------|

## Warning

Do not install in Zone 0 (as defined in IEC 60079-10-1: 2008) or Zone 20 (as defined in IEC 60079-10-2: 2009)(Refer to page 40 for details)

## How to Order

53-SY 5 2 40 - LL - - - -

•UL/CSA compliant

Series

|   |           |
|---|-----------|
| 5 | 53-SY5000 |
| 7 | 53-SY7000 |
| 9 | 53-SY9000 |

Type of actuation

|           |                                                                            |
|-----------|----------------------------------------------------------------------------|
| 1         | 2-position single<br>(A) 4 2 (B)<br>(EA) 5 1 3 (EB)<br>(P)                 |
| 2         | 2-position double<br>(A) 4 2 (B)<br>(EA) 5 1 3 (EB)<br>(P)                 |
| 3 Note 1) | 3-position closed center<br>(A) 4 2 (B)<br>(EA) 5 1 3 (EB)<br>(P)          |
| 4 Note 1) | 3-position exhaust center<br>(A) 4 2 (B)<br>(EA) 5 1 3 (EB)<br>(P)         |
| 5 Note 1) | 3-position pressure center<br>(A) 4 2 (B)<br>(EA) 5 1 3 (EB)<br>(P)        |
| A Note 2) | 4-position dual 3 port valves (N.C./N.C.)<br>4(A) 2(B)<br>5(EA) 1(P) 3(EB) |
| B Note 2) | 4-position dual 3 port valves (N.O./N.O.)<br>4(A) 2(B)<br>5(EA) 1(P) 3(EB) |
| C Note 2) | 4-position dual 3 port valves (N.C./N.O.)<br>4(A) 2(B)<br>5(EA) 1(P) 3(EB) |

Note 1) 3-position type is not available for the 53-SY9000 series.

Note 2) 4-position dual 3 port valves are available for 53-SY5000 only.

•Thread type

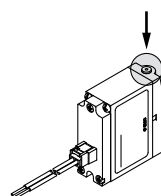
|     |      |
|-----|------|
| Nil | Rc   |
| F   | G    |
| N   | NPT  |
| T   | NPTF |

•Port size

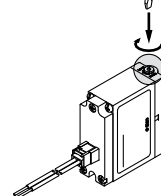
| Symbol | Port size             | Applicable series      |
|--------|-----------------------|------------------------|
| Nil    | Without sub-plate     |                        |
| 02     | 1/4<br>With sub-plate | 53-SY5000<br>53-SY7000 |
| 03     | 3/8<br>With sub-plate | 53-SY7000<br>53-SY9000 |
| 04     | 1/2<br>With sub-plate | 53-SY9000              |

•Manual override

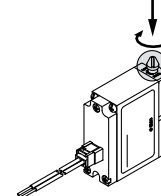
Nil: Non-locking push type



D: Push-turn locking slotted type



E: Push-turn locking lever type



•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             |

•Electrical entry

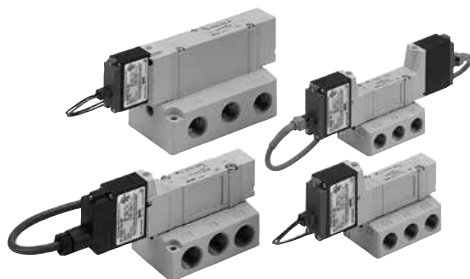
| Symbol           | L                         | LL                                   | TT (Note)                |
|------------------|---------------------------|--------------------------------------|--------------------------|
| Electrical entry | L-type plug connector<br> | L-type plug connector with cover<br> | Terminal type<br>nut<br> |

Note) The lead wire of TT-type is connected to the terminal block. Use only supplied cable and nut.

## Warning

The solenoid must be connected to a safety barrier located in a non-hazardous area. The safety barrier must meet the specifications listed in the Installation Instructions section.

## Specifications



\* Based on IEC 60529

Note) Impact resistance: No malfunction occurred when tested in the axial direction and at the right angles to the main valve and armature in both energized and de-energized states.

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

### Warning

To insure intrinsic safety, the valve is to be installed in an impact and vibration free environment.

| Series                                          |                              | 53-SY5000                                                                           | 53-SY7000 | 53-SY9000 |
|-------------------------------------------------|------------------------------|-------------------------------------------------------------------------------------|-----------|-----------|
| Fluid                                           |                              | Air                                                                                 |           |           |
| Internal pilot operating pressure range         | 2-position single            | 20 to 100 psi (0.15 to 0.7 MPa)                                                     |           |           |
|                                                 | 4-position dual 3 port valve |                                                                                     |           |           |
|                                                 | 2-position double            | 15 to 100 psi (0.1 to 0.7 MPa)                                                      |           |           |
| External pilot operating pressure range         | 3-position                   | 30 to 100 psi (0.2 to 0.7 MPa)                                                      |           |           |
|                                                 | Operating pressure range     | -15 to 100 psi (-100 kPa to 0.7 MPa)                                                |           |           |
|                                                 | Pilot pressure range         | 35 to 100 psi (0.25 to 0.7 MPa)                                                     |           |           |
| Max. operating frequency (Hz)                   | 2-position single, double    | 5                                                                                   |           |           |
|                                                 | 4-position dual 3 port valve |                                                                                     |           |           |
|                                                 | 3-position                   | 3                                                                                   |           |           |
| Manual override (Manual operation)              |                              | Non-locking push type, Push-turn locking slotted type, Push-turn locking lever type |           |           |
| Pilot exhaust method                            | Internal pilot               | Main/Pilot valve common exhaust                                                     |           |           |
|                                                 | External pilot               | Pilot valve individual exhaust                                                      |           |           |
| Lubrication                                     |                              | Not required                                                                        |           |           |
| Mounting orientation                            |                              | Unrestricted                                                                        |           |           |
| Impact/Vibration resistance (m/s <sup>2</sup> ) |                              | 150/30                                                                              |           |           |
| Enclosure                                       |                              | IP30 (L-type), IP40 (LL-type), IP65 (TT-type)                                       |           |           |

## Solenoid Specifications

|                               |                                                                                          |
|-------------------------------|------------------------------------------------------------------------------------------|
| Electrical entry              | Terminal type (TT)<br>L-type plug connector (L)<br>L-type plug connector with cover (LL) |
| Coil rated voltage            | 12 VDC                                                                                   |
| Power consumption             | 0.52 W (at rated voltage)                                                                |
| Allowable voltage fluctuation | -10% to +10% of rate voltage                                                             |
| Temperature class             | T4<br>Maximum surface temperature 275°F (135°C)                                          |

## Hazardous Locations Specifications

|                     |                                                              |                                                          |
|---------------------|--------------------------------------------------------------|----------------------------------------------------------|
| Electrical entry    | Terminal type (TT)                                           | L-type plug connector (L)<br>LL-type plug connector (LL) |
| Hazardous Locations | Class I, II, III<br>Division 1<br>Groups A, B, C, D, E, F, G | Class I<br>Division 1<br>Groups A, B, C, D               |

Note) **Warning** Do not install in Zone 0 (as defined in IEC 60079-10-1: 2008) or Zone 20 (as defined in IEC 60079-10-2: 2009) (Refer to page 40 for details)

## Response Time

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

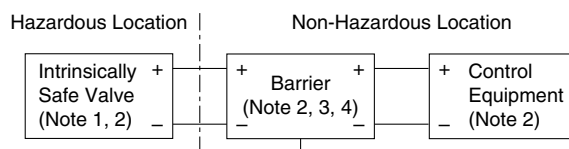
| Type of actuation            | Response time (ms) (at 70 psi [0.5 MPa]) |            |            |
|------------------------------|------------------------------------------|------------|------------|
|                              | 53-SY5000                                | 53-SY7000  | 53-SY9000  |
| 2-position single            | 26 or less                               | 38 or less | 50 or less |
| 2-position double            | 22 or less                               | 30 or less | 50 or less |
| 3-position                   | 38 or less                               | 56 or less | —          |
| 4-position dual 3 port valve | 24 or less                               | —          | —          |

Note) Response time may be longer depending on the specification of barrier.

## Warning

## Installation Instructions

### Installation Diagram



- This product must be connected in accordance with the +/- polarity indication.
- This product must be connected to a certified intrinsically safe circuit (e.g. Zener barrier) for apparatus group IIC with the following maximum values:  
 $U_i = 28\text{ V}$     $I_i = 225\text{ mA}$  (resistively limited)  
 $P_i = 1\text{ W}$     $C_i = 0\text{ nF}$     $L_i = 0\text{ mH}$   
 Confirm the solenoid input voltage at the lead wires is 12 VDC 10%.  
 The resistance of the solenoid valve is  $R_{20} + 278\text{ } \Omega$  3% Ohm at 68°F (20°C).
- Do not bend or pull cables repeatedly.

### Warning

Note)

- Control equipment connected to the barrier must not use or generate more than 250 V.
- Installation should be in accordance with Canadian Electrical Code or ANSI/ISA RP12.6 "Installation of Intrinsically Safe Systems for Hazardous (Classified) Locations" and the National Electrical Code or ANSI/NFPA 70.
- Barrier manufacturer's installation drawing must be followed when installing this equipment.
- Multiple barriers are not to be used in parallel unless specifically permitted by the barrier certification.

To insure that intrinsically safe criteria are met, use the below parameters to determine the appropriate barrier.

Note) C<sub>cab</sub> and L<sub>cab</sub> represents the capacitance and inductance of wire added by the consumer from the intrinsically safe equipment to the barrier. C<sub>cab</sub> and L<sub>cab</sub> values must be used in the system calculations.

| I.S. Equipment  |        | Barrier              |
|-----------------|--------|----------------------|
| $U_i$           | $\geq$ | $U_o$ (or $V_{oc}$ ) |
| $I_i$           | $\geq$ | $I_o$ (or $I_{sc}$ ) |
| $P_i$           | $\geq$ | $P_o$                |
| $C_i + C_{cab}$ | $\leq$ | $C_o$ (or $C_a$ )    |
| $L_i + L_{cab}$ | $\leq$ | $L_o$ (or $L_a$ )    |

If the cable capacitance and inductance are unknown, use the following values:

C<sub>cab</sub> = 60 pF/ft., L<sub>cab</sub> = 0.2 μH/ft.

If the barrier P<sub>o</sub> is unknown, it may be calculated using the formula  $P_o = (U_o \times I_o)/4$  or  $(V_{oc} \times I_{sc})/4$ .

# Series 53-SY5000/7000/9000

## Flow-rate Characteristics

### Series 53-SY5000

| Valve model        | Type of actuation         |                 | Port size | Flow-rate characteristics <sup>Note)</sup> |                |                |                         |                |                |
|--------------------|---------------------------|-----------------|-----------|--------------------------------------------|----------------|----------------|-------------------------|----------------|----------------|
|                    |                           |                 |           | 1 → 4/2 (P → A/B)                          |                |                | 4/2 → 5/3 (A/B → EA/EB) |                |                |
|                    |                           |                 |           | C [dm³/(s·bar)]                            | b              | Cv             | C [dm³/(s·bar)]         | b              | Cv             |
| 53-SY5□40-□<br>-02 | 2-position                | Single          | 1/4       | 2.4                                        | 0.41           | 0.64           | 2.8                     | 0.29           | 0.66           |
|                    |                           | Double          |           |                                            |                |                |                         |                |                |
|                    | 3-position                | Closed center   |           | 1.8                                        | 0.47           | 0.50           | 1.8                     | 0.40           | 0.47           |
|                    |                           | Exhaust center  |           | 1.4                                        | 0.55           | 0.44           | 3.0<br>[1.2]            | 0.33<br>[0.48] | 0.72<br>[0.37] |
|                    |                           | Pressure center |           | 3.3<br>[0.84]                              | 0.36<br>[0.60] | 0.85<br>[0.28] | 1.8                     | 0.40           | 0.48           |
|                    |                           |                 |           |                                            |                |                |                         |                |                |
|                    | 4-position<br>dual 3 port | N.C./N.C.       |           | 1.8                                        | 0.39           | 0.56           | 2.2                     | 0.32           | 0.64           |
|                    |                           | N.O./N.O.       |           | 2.4                                        | 0.34           | 0.72           | 1.9                     | 0.38           | 0.59           |

Note) [ ]: Indicates normal position

### Series 53-SY7000

| Valve model        | Type of actuation |                 | Port size | Flow-rate characteristics <sup>Note)</sup> |                |               |                         |                |               |
|--------------------|-------------------|-----------------|-----------|--------------------------------------------|----------------|---------------|-------------------------|----------------|---------------|
|                    |                   |                 |           | 1 → 4/2 (P → A/B)                          |                |               | 4/2 → 5/3 (A/B → EA/EB) |                |               |
|                    |                   |                 |           | C [dm³/(s·bar)]                            | b              | Cv            | C [dm³/(s·bar)]         | b              | Cv            |
| 53-SY7□40-□<br>-02 | 2-position        | Single          | 1/4       | 4.1                                        | 0.41           | 1.1           | 4.1                     | 0.29           | 1.0           |
|                    |                   | Double          |           |                                            |                |               |                         |                |               |
|                    | 3-position        | Closed center   |           | 3.0                                        | 0.43           | 0.80          | 2.6                     | 0.41           | 0.72          |
|                    |                   | Exhaust center  |           | 2.6                                        | 0.42           | 0.71          | 4.7<br>[1.7]            | 0.35<br>[0.48] | 1.1<br>[0.49] |
|                    |                   | Pressure center |           | 5.3<br>[2.3]                               | 0.39<br>[0.49] | 1.3<br>[0.65] | 2.2                     | 0.49           | 0.63          |
| 53-SY7□40-□<br>-03 | 2-position        | Single          | 3/8       | 4.9                                        | 0.29           | 1.2           | 4.5                     | 0.27           | 1.1           |
|                    |                   | Double          |           |                                            |                |               |                         |                |               |
|                    | 3-position        | Closed center   |           | 3.0                                        | 0.40           | 0.80          | 2.6                     | 0.45           | 0.73          |
|                    |                   | Exhaust center  |           | 2.6                                        | 0.42           | 0.71          | 4.8<br>[1.7]            | 0.35<br>[0.48] | 1.1<br>[0.49] |
|                    |                   | Pressure center |           | 5.3<br>[2.3]                               | 0.31<br>[0.51] | 1.3<br>[0.64] | 2.3                     | 0.45           | 0.66          |

Note) [ ]: Indicates normal position

### Series 53-SY9000

| Valve model        | Type of actuation |        | Port size | Flow-rate characteristics |      |     |                         |      |     |
|--------------------|-------------------|--------|-----------|---------------------------|------|-----|-------------------------|------|-----|
|                    |                   |        |           | 1 → 4/2 (P → A/B)         |      |     | 4/2 → 5/3 (A/B → EA/EB) |      |     |
|                    |                   |        |           | C [dm³/(s·bar)]           | b    | Cv  | C [dm³/(s·bar)]         | b    | Cv  |
| 53-SY9□40-□<br>-03 | 2-position        | Single | 3/8       | 7.9                       | 0.34 | 2.0 | 9.6                     | 0.43 | 2.6 |
|                    |                   | Double |           |                           |      |     |                         |      |     |
| 53-SY9□40-□<br>-04 | 2-position        | Single | 1/2       | 8.0                       | 0.48 | 2.2 | 10                      | 0.29 | 2.5 |
|                    |                   | Double |           |                           |      |     |                         |      |     |

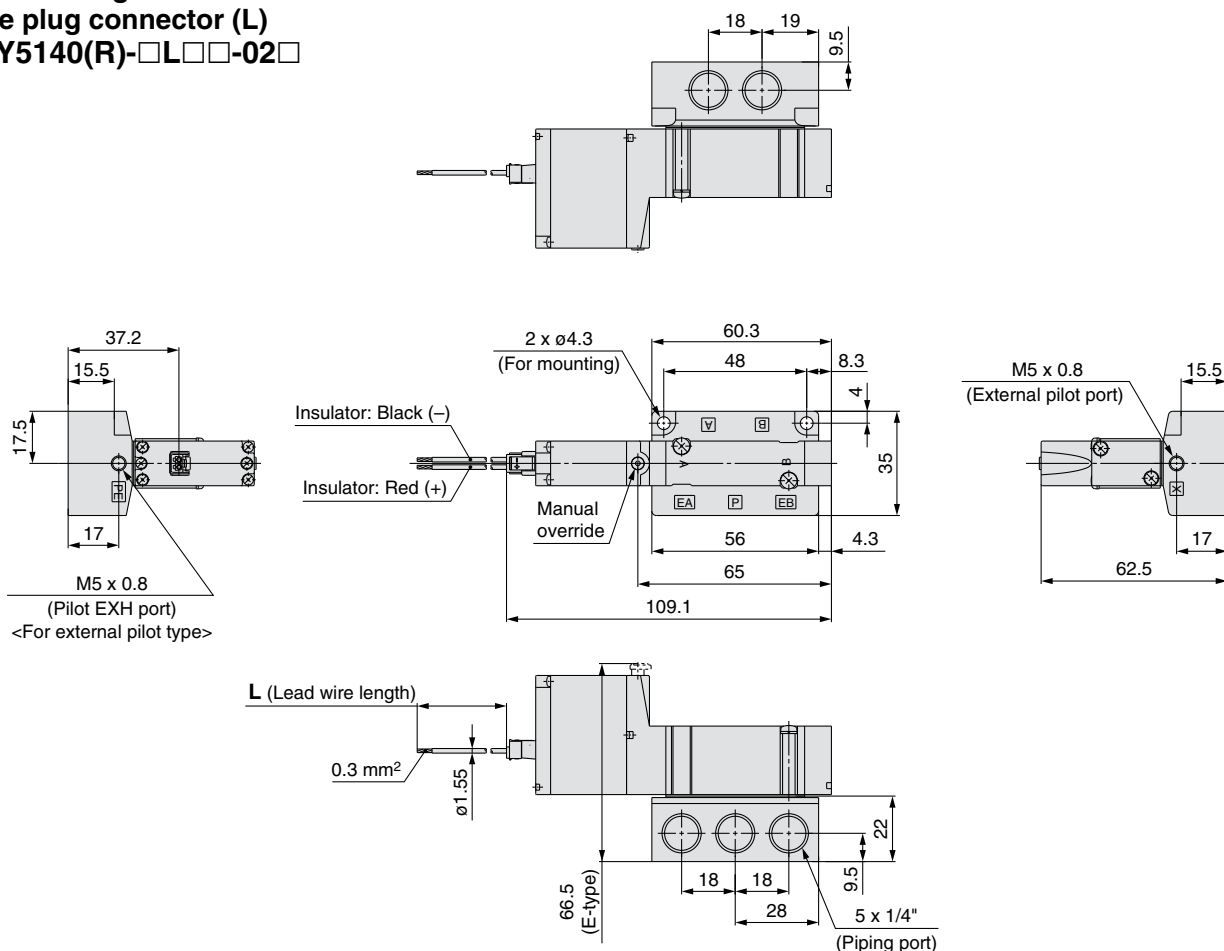
## Dimensions: 53-SY5000

(mm)

### 2-position single

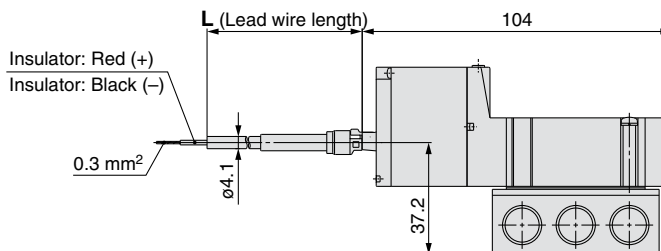
### L-type plug connector (L)

53-SY5140(R)-□L□□-02□



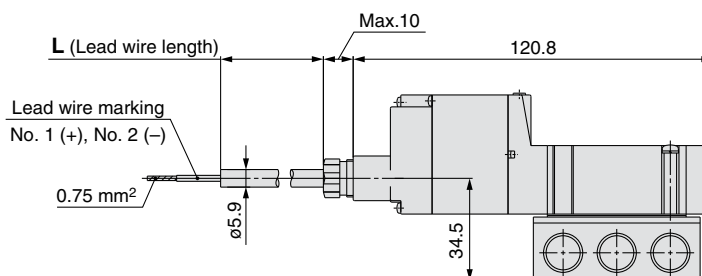
### L-type plug connector with cover (LL)

53-SY5140(R)-□LL□□-02□



### Terminal type (TT)

53-SY5140(R)-□TT□□-02□



# Series 53-SY5000/7000/9000

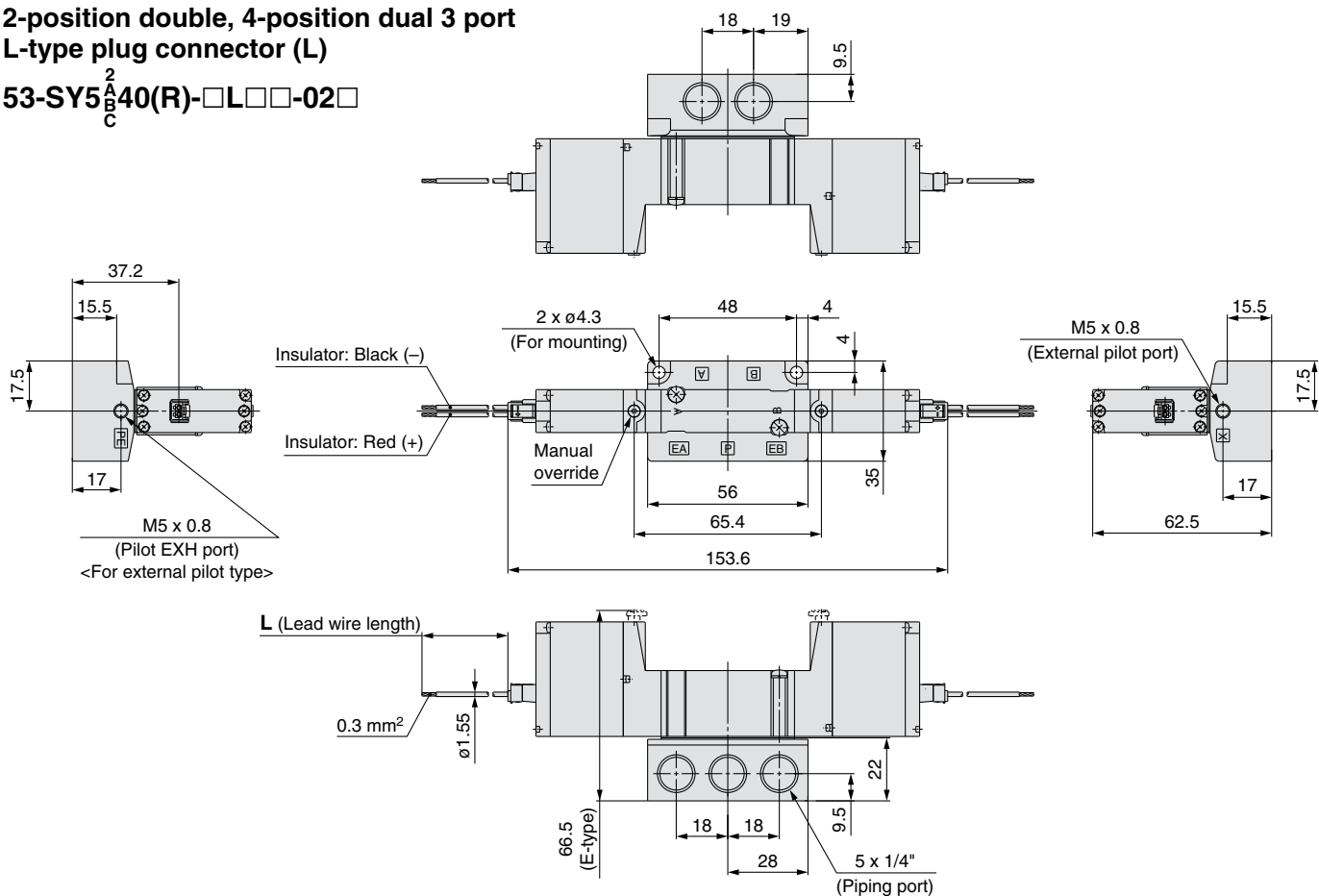
## Dimensions: 53-SY5000

(mm)

2-position double, 4-position dual 3 port

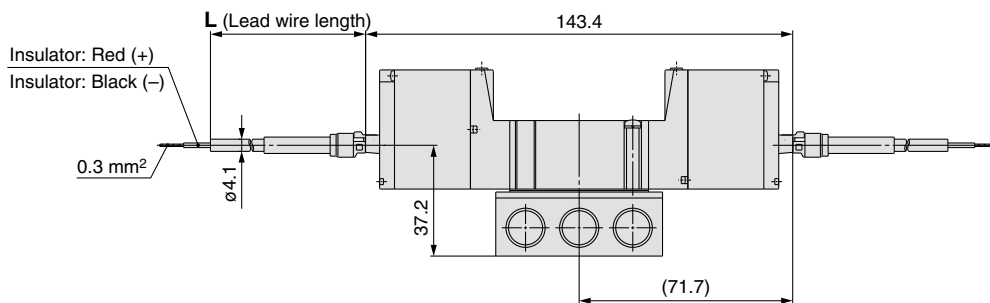
L-type plug connector (L)

53-SY5<sup>A</sup><sub>B</sub>40(R)-□L□□-02□  
C



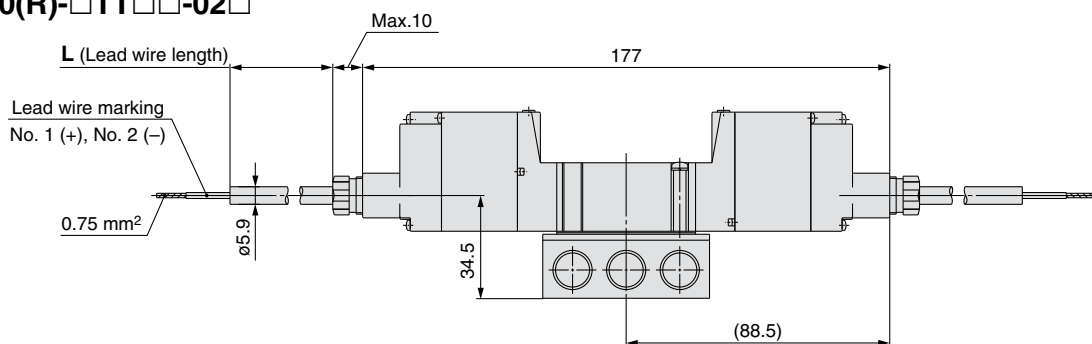
L-type plug connector with cover (LL)

53-SY5<sup>A</sup><sub>B</sub>40(R)-□LL□□-02□  
C



Terminal type (TT)

53-SY5<sup>A</sup><sub>B</sub>40(R)-□TT□□-02□  
C



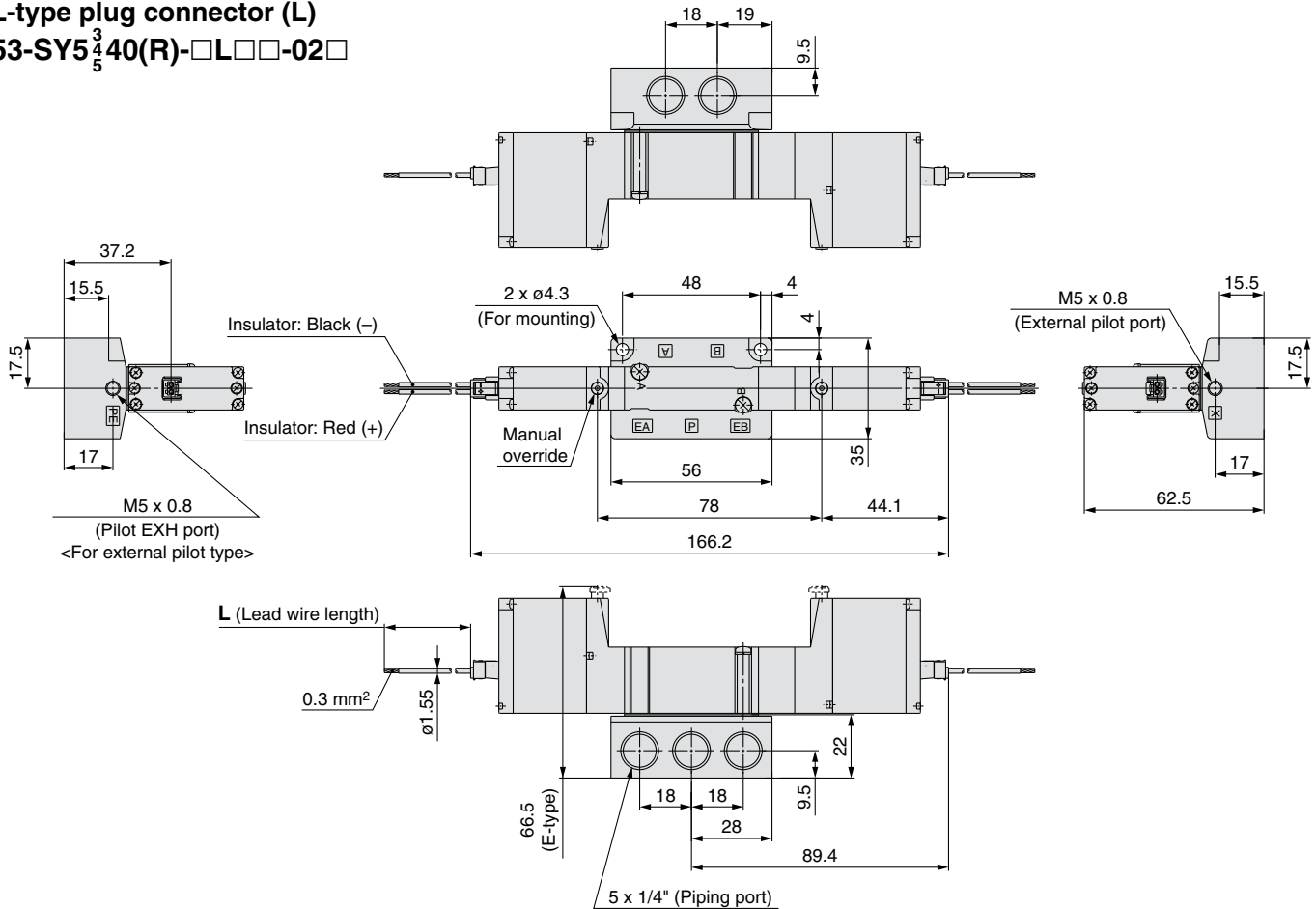
**Dimensions: 53-SY5000**

(mm)

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

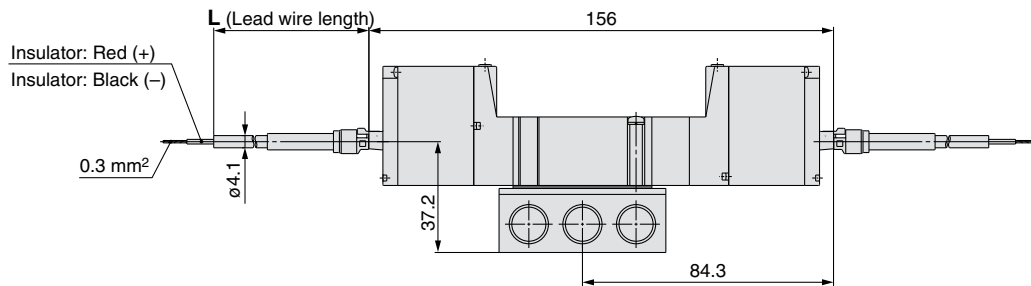
**L-type plug connector (L)**

**53-SY<sup>3</sup><sub>5</sub>40(R)-□L□□-02□**



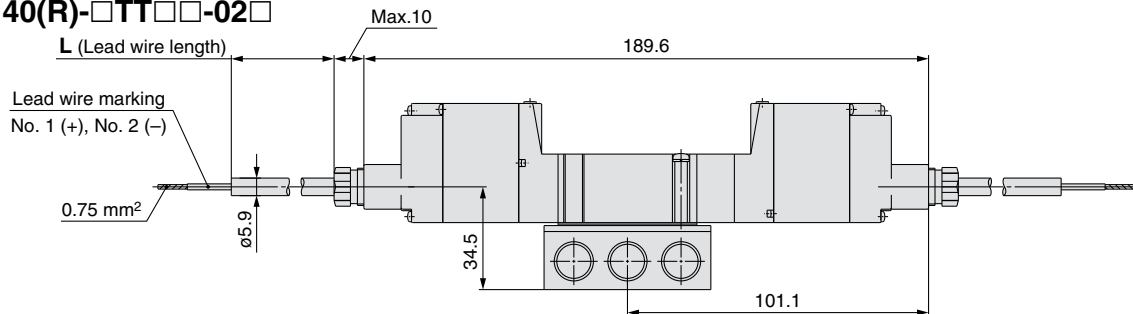
**L-type plug connector with cover (LL)**

**53-SY<sup>3</sup><sub>5</sub>40(R)-□LL□□-02□**



**Terminal type (TT)**

**53-SY<sup>3</sup><sub>5</sub>40(R)-□TT□□-02□**



# Series 53-SY5000/7000/9000

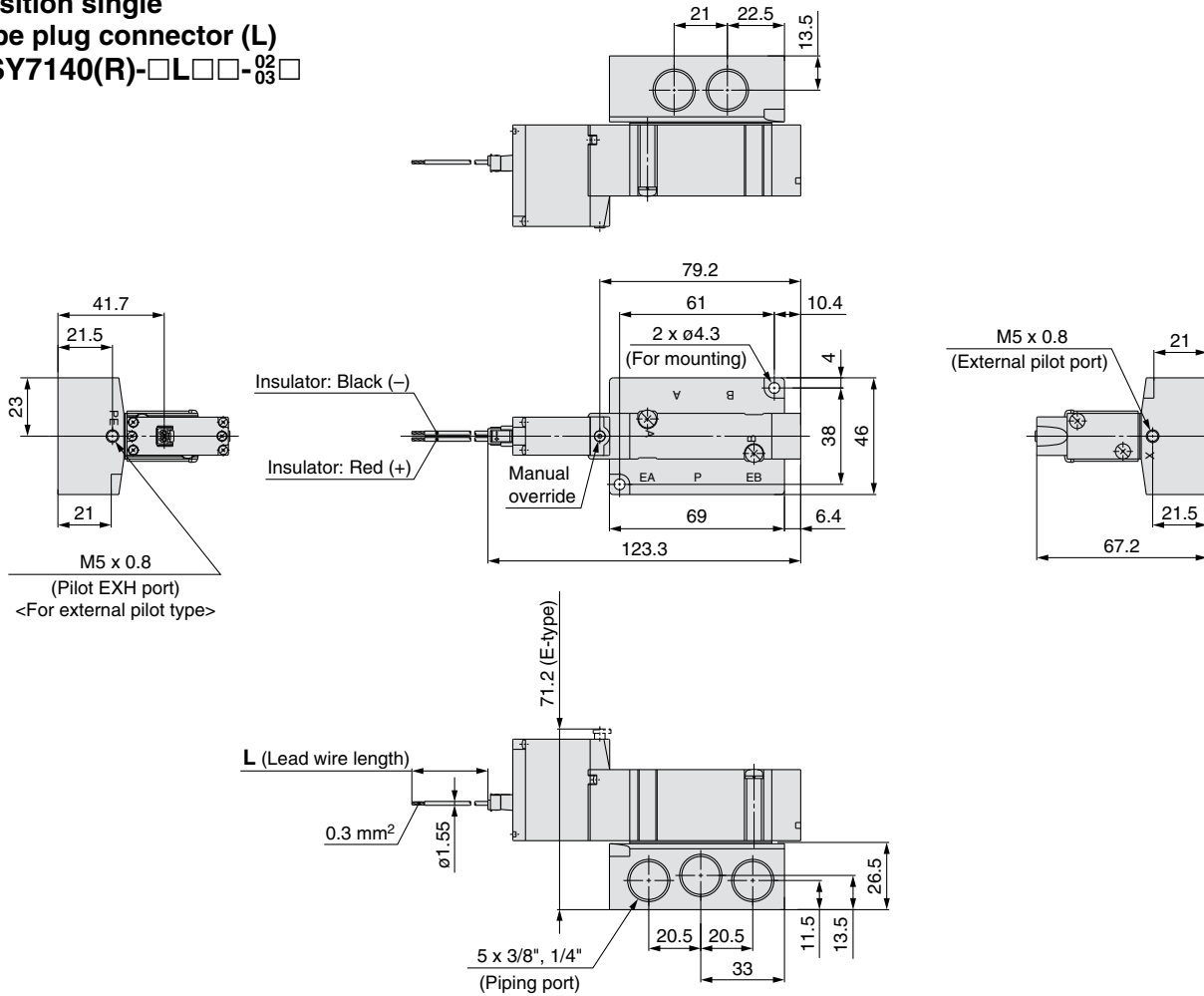
## Dimensions: 53-SY7000

(mm)

### 2-position single

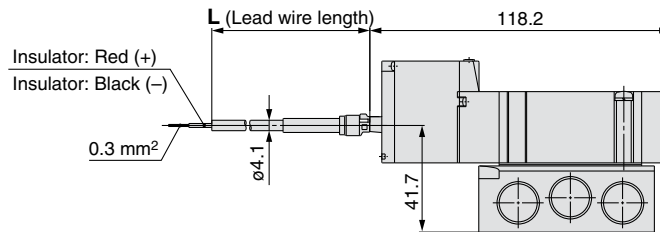
### L-type plug connector (L)

53-SY7140(R)-□L□□-<sup>02</sup><sub>03</sub>□



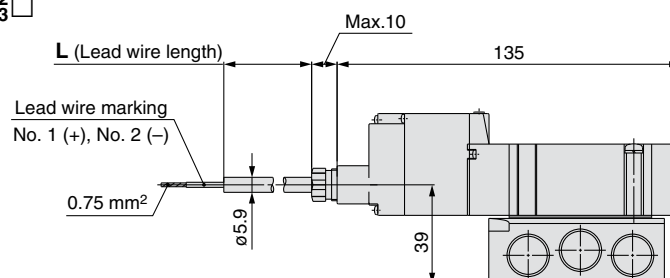
### L-type plug connector with cover (LL)

53-SY7140(R)-□LL□□-<sup>02</sup><sub>03</sub>□



### Terminal type (TT)

53-SY7140(R)-□TT□□-<sup>02</sup><sub>03</sub>□



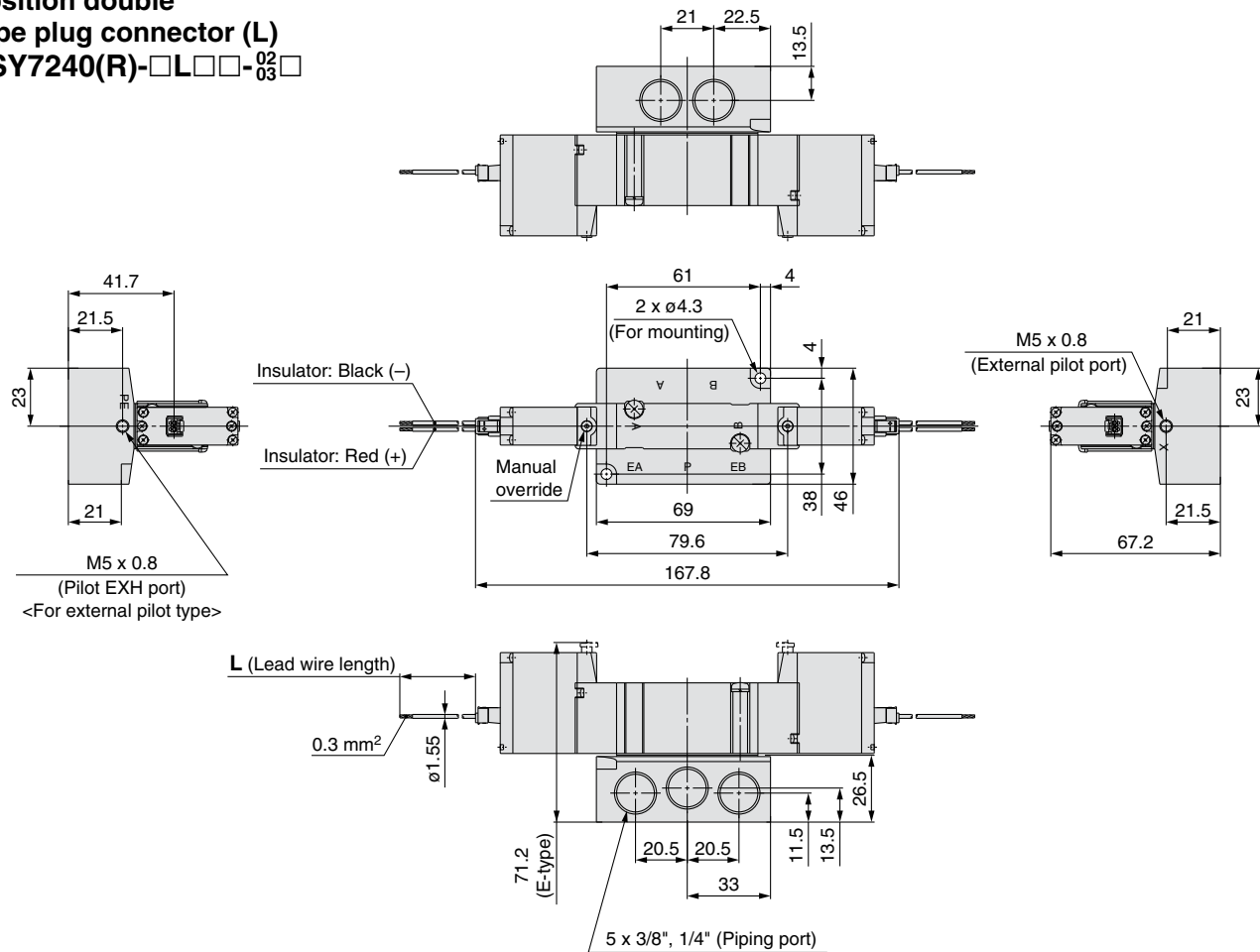
## Dimensions: 53-SY7000

(mm)

### 2-position double

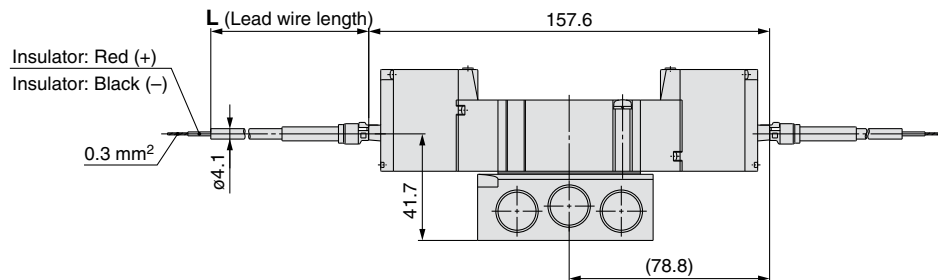
#### L-type plug connector (L)

53-SY7240(R)-□L□□-<sup>02</sup><sub>03</sub>□



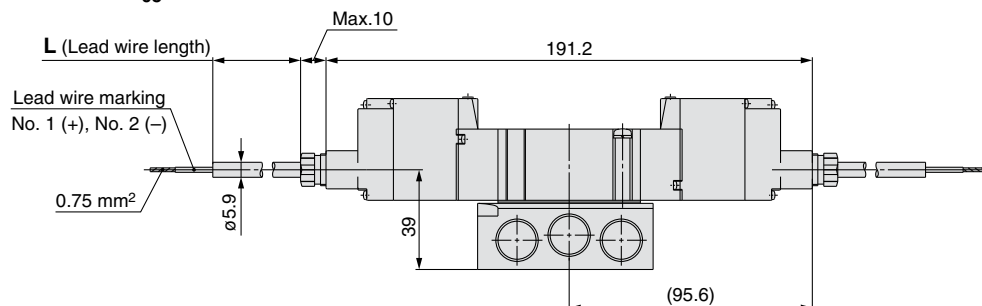
### L-type plug connector with cover (LL)

53-SY7240(R)-□LL□□-<sup>02</sup><sub>03</sub>□

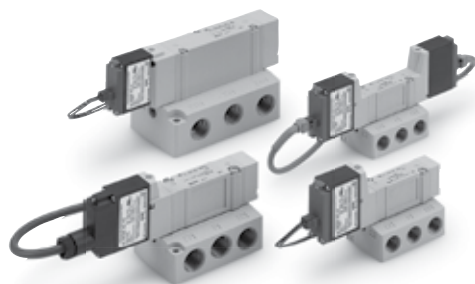


### Terminal type (TT)

53-SY7240(R)-□TT□□-<sup>02</sup><sub>03</sub>□



# Series 53-SY5000/7000/9000



\* Based on IEC 60529

Note) Impact resistance: No malfunction occurred when tested in the axial direction and at the right angles to the main valve and armature in both energized and de-energized states.

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

## Warning

To insure intrinsic safety, the valve is to be installed in an impact and vibration free environment.

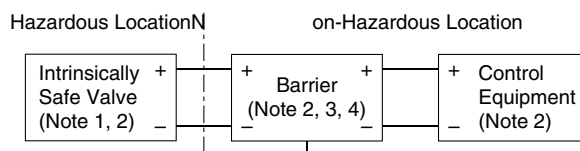
## Specifications

| Series                                                            |                                                           | 53-SY5000                                                                                 | 53-SY7000                       | 53-SY9000 |
|-------------------------------------------------------------------|-----------------------------------------------------------|-------------------------------------------------------------------------------------------|---------------------------------|-----------|
| Fluid                                                             |                                                           | Air                                                                                       |                                 |           |
| Internal pilot operating pressure range                           |                                                           | 2-position single<br>4-position dual 3 port valve                                         | 0.15 to 0.7 MPa (20 to 100 psi) |           |
|                                                                   |                                                           | 2-position double                                                                         | 0.1 to 0.7 MPa (15 to 100 psi)  |           |
|                                                                   |                                                           | 3-position                                                                                | 0.2 to 0.7 MPa (30 to 100 psi)  |           |
| External pilot operating pressure range                           | Operating pressure range                                  | -100 kPa to 0.7 MPa (-15 to 100 psi)                                                      |                                 |           |
|                                                                   | Pilot pressure range                                      | 2-position single                                                                         | 0.25 to 0.7 MPa (35 to 100 psi) |           |
|                                                                   |                                                           | 2-position double                                                                         | 0.25 to 0.7 MPa (35 to 100 psi) |           |
|                                                                   |                                                           | 3-position                                                                                | 0.25 to 0.7 MPa (35 to 100 psi) |           |
| Ambient and fluid temperature                                     |                                                           | -10 to 50°C (15 to 120°F) (No freezing)                                                   |                                 |           |
| Max. operating frequency (Hz)                                     | 2-position single, double<br>4-position dual 3 port valve | 1                                                                                         |                                 |           |
|                                                                   | 3-position                                                | 1                                                                                         |                                 |           |
| Manual override (Manual operation)                                |                                                           | Non-locking push type,<br>Push-turn locking slotted type,<br>Push-turn locking lever type |                                 |           |
| Pilot exhaust method                                              | Internal pilot                                            | Main/Pilot valve common exhaust                                                           |                                 |           |
|                                                                   | External pilot                                            | Pilot valve individual exhaust                                                            |                                 |           |
| Lubrication                                                       |                                                           | Not required                                                                              |                                 |           |
| Mounting orientation                                              |                                                           | Unrestricted                                                                              |                                 |           |
| Impact/Vibration resistance (m/s <sup>2</sup> ) <sup>(Note)</sup> |                                                           | 150/30                                                                                    |                                 |           |
| Enclosure                                                         |                                                           | IP30 (L-type), IP40 (LL-type), IP65 (TT-type)                                             |                                 |           |

## Warning

### Installation Instructions

#### Installation Diagram



- This product must be connected in accordance with the +/- polarity indication.
- This product must be connected to a certified intrinsically safe circuit (e.g. Zener barrier) for apparatus group IIC with the following maximum values:  
 $U_i = 28\text{ V}$     $I_i = 225\text{ mA}$  (resistively limited)  
 $P_i = 1\text{ W}$     $C_i = 0\text{ nF}$     $L_i = 0\text{ mH}$   
 Confirm the solenoid input voltage at the lead wires is  $12\text{ VDC} \pm 10\%$ .  
 The resistance of the solenoid valve is  $R_{20} + 278 \pm 3\%$  Ohm at  $20^\circ\text{C}$ .
- Do not bend or pull cables repeatedly.

## Warning

Note)

- Control equipment connected to the barrier must not use or generate more than 250 V.
- Installation should be in accordance with Canadian Electrical Code or ANSI/ISA RP12.6 "Installation of Intrinsically Safe Systems for Hazardous (Classified) Locations" and the National Electrical Code or ANSI/NFPA 70.
- Barrier manufacturer's installation drawing must be followed when installing this equipment.
- Multiple barriers are not to be used in parallel unless specifically permitted by the barrier certification.

To insure that intrinsically safe criteria are met, use the below parameters to determine the appropriate barrier.

Note) C<sub>cable</sub> and L<sub>cable</sub> represents the capacitance and inductance of wire added by the consumer from the intrinsically safe equipment to the barrier. C<sub>cable</sub> and L<sub>cable</sub> values must be used in the system calculations.

| I.S. Equipment                      | Barrier                              |
|-------------------------------------|--------------------------------------|
| U <sub>i</sub>                      | U <sub>o</sub> (or V <sub>oc</sub> ) |
| I <sub>i</sub>                      | I <sub>o</sub> (or I <sub>sc</sub> ) |
| P <sub>i</sub>                      | P <sub>o</sub>                       |
| C <sub>i</sub> + C <sub>cable</sub> | C <sub>o</sub> (or C <sub>a</sub> )  |
| L <sub>i</sub> + L <sub>cable</sub> | L <sub>o</sub> (L <sub>a</sub> )     |

If the cable capacitance and inductance are unknown, use the following values:

C<sub>cable</sub> = 60 pF/ft., L<sub>cable</sub> = 0.2 μH/ft.

If the barrier P<sub>o</sub> is unknown, it may be calculated using the formula  $P_o = (U_o \times I_o)/4$  or  $(V_{oc} \times I_{sc})/4$ .

## Solenoid Specifications

|                               |                                                                                          |
|-------------------------------|------------------------------------------------------------------------------------------|
| Electrical entry              | Terminal type (TT)<br>L-type plug connector (L)<br>L-type plug connector with cover (LL) |
| Coil rated voltage            | 12 VDC                                                                                   |
| Power consumption             | 0.52 W (at rated voltage)                                                                |
| Allowable voltage fluctuation | -10% to +10% of rate voltage                                                             |
| Temperature class             | T4<br>Maximum surface temperature 135°C (275°F)                                          |

## Hazardous Locations Specifications

|                     |                                                              |                                                          |
|---------------------|--------------------------------------------------------------|----------------------------------------------------------|
| Electrical entry    | Terminal type (TT)                                           | L-type plug connector (L)<br>LL-type plug connector (LL) |
| Hazardous Locations | Class I, II, III<br>Division 1<br>Groups A, B, C, D, E, F, G | Class I<br>Division 1<br>Groups A, B, C, D               |

Note) **Warning** Do not install in Zone 0 (as defined in IEC 60079-10-1: 2008) or Zone 20 (as defined in IEC 60079-10-2: 2009) (Refer to page 40 for details)

## Response Time

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

| Type of actuation               | Response time (ms) (at 0.5 MPa) <small>Note)</small> |            |            |
|---------------------------------|------------------------------------------------------|------------|------------|
|                                 | 53-SY5000                                            | 53-SY7000  | 53-SY9000  |
| 2-position single               | 26 or less                                           | 38 or less | 50 or less |
| 2-position double               | 22 or less                                           | 30 or less | 50 or less |
| 3-position                      | 38 or less                                           | 56 or less | —          |
| 4-position dual<br>3 port valve | 24 or less                                           | —          | —          |

Note) Response time may be longer depending on the specification of barrier.

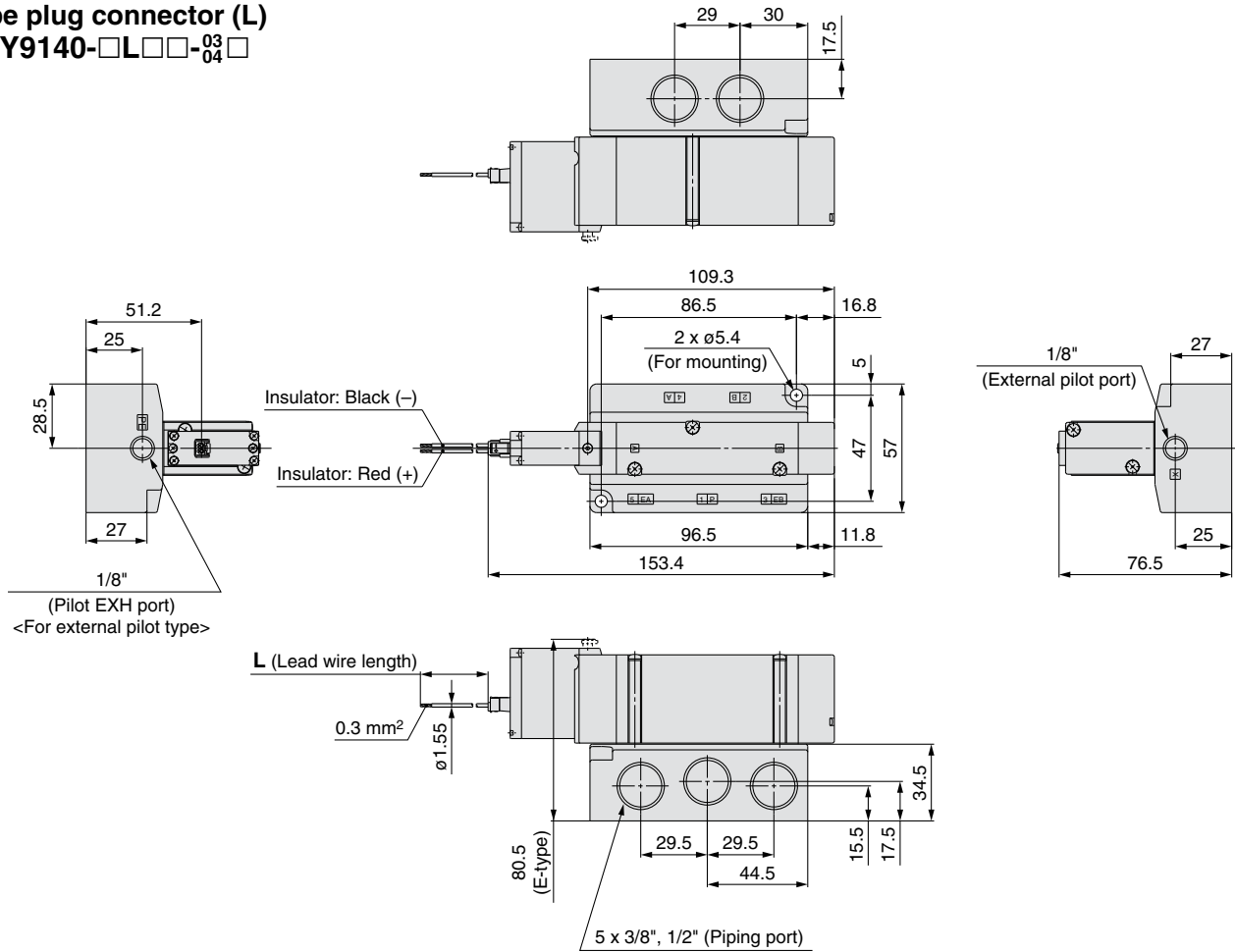
## Dimensions: 53-SY9000

(mm)

### 2-position single

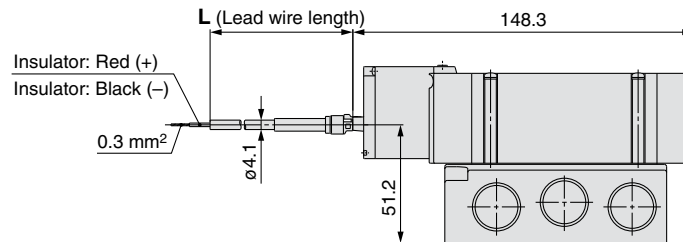
### L-type plug connector (L)

53-SY9140-□L□□-<sup>03</sup><sub>04</sub>□



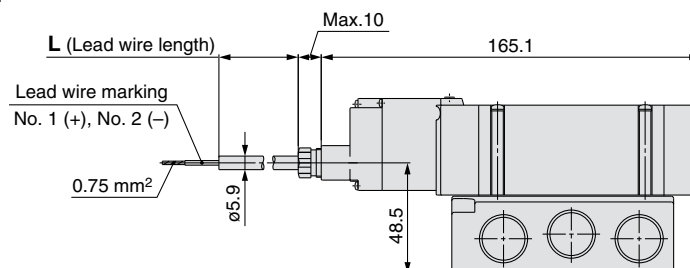
### L-type plug connector with cover (LL)

53-SY9140-□LL□□-<sup>03</sup><sub>04</sub>□



### Terminal type (TT)

53-SY9140-□TT□□-<sup>03</sup><sub>04</sub>□

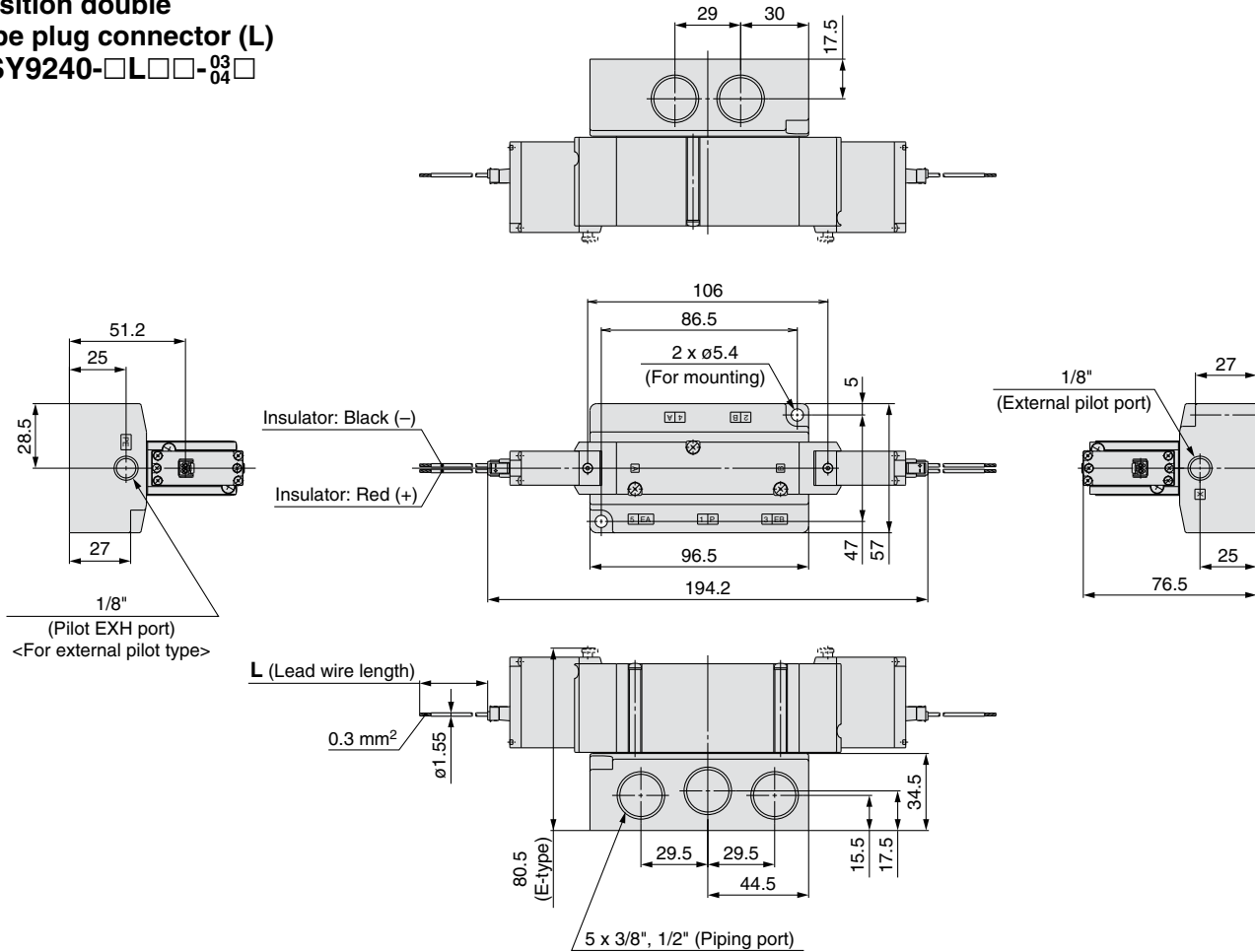


# Series 53-SY5000/7000/9000

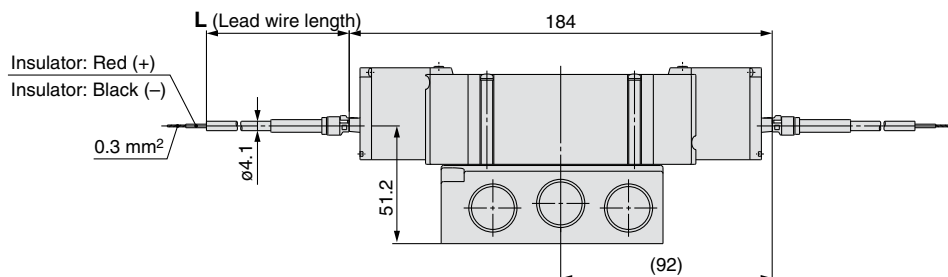
## Dimensions: 53-SY9000

(mm)

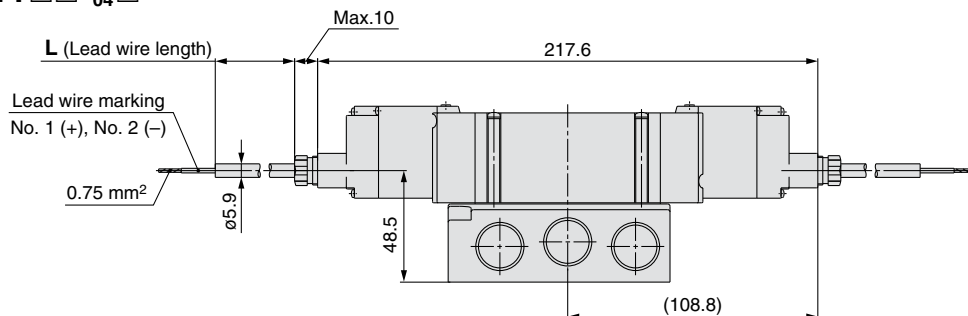
2-position double  
L-type plug connector (L)  
53-SY9240-□L□□-<sup>03</sup><sub>04</sub>□



L-type plug connector with cover (LL)  
53-SY9240-□LL□□-<sup>03</sup><sub>04</sub>□



Terminal type (TT)  
53-SY9240-□TT□□-<sup>03</sup><sub>04</sub>□





Type **20**

# 5 Port Solenoid Valve Series **53-SY5000/7000** Body Ported Manifold **Bar Stock Type**

## How to Order Manifold

**53 - SS5Y 5 - 20 - 05 -**

UL/CSA  
compliant

| Manifold series |           |
|-----------------|-----------|
| 5               | 53-SY5000 |
| 7               | 53-SY7000 |

Stations

|    |             |
|----|-------------|
| 02 | 2 stations  |
| ⋮  | ⋮           |
| 20 | 20 stations |

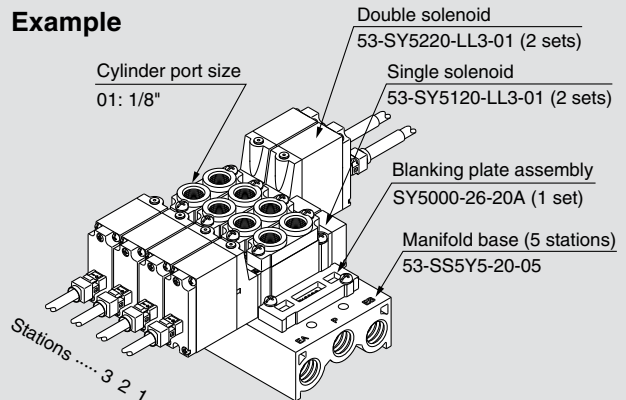
\* This also includes the number of blanking plate assemblies.

Thread type

|     |      |
|-----|------|
| Nil | Rc   |
| 00F | G    |
| 00N | NPT  |
| 00T | NPTF |

## How to Order Valve Manifold Assembly

### Example



53-SS5Y5-20-05 ..... 1 set (Type 20, 5 station manifold base part no.)  
 \* SY5000-26-20A ..... 1 set (Blanking plate assembly part no.)  
 \* 53-SY5120-LL3-01 ..... 2 sets (Single solenoid part no.)  
 \* 53-SY5220-LL3-01 ..... 2 sets (Double solenoid part no.)

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.

|                                                                                                           |                                                                                               |
|-----------------------------------------------------------------------------------------------------------|-----------------------------------------------------------------------------------------------|
| Electrical Entry TT<br>Hazardous Location<br>Class I, II, III<br>Division 1<br>Groups A, B, C, D, E, F, G | Electrical Entry L and LL<br>Hazardous Location<br>Class I<br>Division 1<br>Groups A, B, C, D |
|-----------------------------------------------------------------------------------------------------------|-----------------------------------------------------------------------------------------------|



## Warning

Do not install in Zone 0 (as defined in IEC 60079-10-1: 2008) or Zone 20 (as defined in IEC 60079-10-2: 2009) (Refer to page 40 for details)

## How to Order Valve

**53-SY 5 1 20-LL 3 - 01**

UL/CSA  
compliant

Series

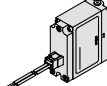
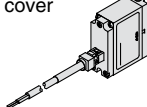
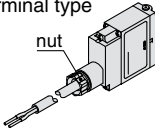
|   |           |
|---|-----------|
| 5 | 53-SY5000 |
| 7 | 53-SY7000 |

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               |
| A <sup>Note)</sup> | 4-position dual 3 port valve (N.C./N.C.) |
| B <sup>Note)</sup> | 4-position dual 3 port valve (N.O./N.O.) |
| C <sup>Note)</sup> | 4-position dual 3 port valve (N.C./N.O.) |

Note) 4-position dual 3 port valves are available for 53-SY5000 only.

Electrical entry

| Symbol              | Electrical entry                                                                                                        |
|---------------------|-------------------------------------------------------------------------------------------------------------------------|
| L                   | L-type plug connector<br>            |
| LL                  | L-type plug connector with cover<br> |
| TT <sup>Note)</sup> | Terminal type<br>nut<br>             |

Note) The lead wire of TT-type is connected to the terminal block. Use only supplied cable and nut.

Thread type

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

A, B port size  
Thread piping

| Symbol | Port size | Applicable series |
|--------|-----------|-------------------|
| 01     | 1/8       | 53-SY5000         |
| 02     | 1/4       | 53-SY7000         |

One-touch fitting (Metric size) <sup>Note)</sup>

| Symbol | Port size             | Applicable series |
|--------|-----------------------|-------------------|
| C4     | ø4 One-touch fitting  | 53-SY5000         |
| C6     | ø6 One-touch fitting  |                   |
| C8     | ø8 One-touch fitting  |                   |
| C8     | ø8 One-touch fitting  | 53-SY7000         |
| C10    | ø10 One-touch fitting |                   |

One-touch fitting (Inch size) <sup>Note)</sup>

| Symbol | Port size                | Applicable series |
|--------|--------------------------|-------------------|
| N3     | ø5/32" One-touch fitting | 53-SY5000         |
| N7     | ø1/4" One-touch fitting  |                   |
| N9     | ø5/16" One-touch fitting |                   |
| N9     | ø5/16" One-touch fitting | 53-SY7000         |
| N11    | ø3/8" One-touch fitting  |                   |

Note) **Warning**

If a resin tubing is used, take precautions against static electricity.

Manual override

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

Lead wire length

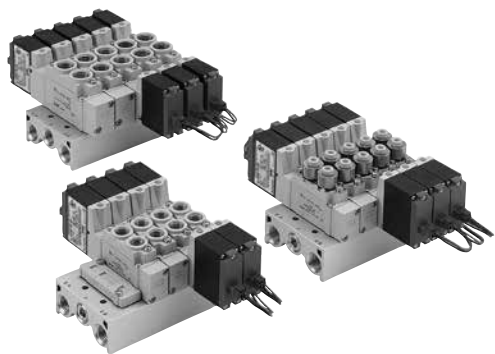
| Symbol | Lead wire length | Note                      |
|--------|------------------|---------------------------|
| 3      | 300 mm           | —                         |
| 6      | 600 mm           | Maximum length for L-type |
| 10     | 1000 mm          | —                         |
| 15     |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

## Warning

The solenoid must be connected to a safety barrier located in a non-hazardous area. The safety barrier must meet the specifications listed in the Installation Instructions section.

Note) When placing an order for body ported solenoid valve as a single unit, mounting screws and gaskets for manifold are not included. Order them separately, if necessary. (For details, refer to page 30.)

# Series 53-SY5000/7000



## Manifold Specifications

| Model                                     |                | 53-SS5Y5-20                                                                                                                                                                                  | 53-SS5Y7-20                                                                                                                      |
|-------------------------------------------|----------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------------------------------------------------------------------------------------------------------------------------------|
| Applicable valve                          |                | 53-SY5□20                                                                                                                                                                                    | 53-SY7□20                                                                                                                        |
| Manifold type                             |                | Single base B mount                                                                                                                                                                          |                                                                                                                                  |
| P (SUP)/R (EXH)                           |                | Common SUP/EXH                                                                                                                                                                               |                                                                                                                                  |
| Valve stations                            |                | 2 to 20 stations <sup>Note 1)</sup>                                                                                                                                                          |                                                                                                                                  |
| A, B port location                        |                | Valve                                                                                                                                                                                        |                                                                                                                                  |
| Port size                                 | P, EA, EB port | 1/4                                                                                                                                                                                          |                                                                                                                                  |
|                                           | A, B port      | 1/8<br>C4 (ø4 One-touch fitting)<br>C6 (ø6 One-touch fitting)<br>C8 (ø8 One-touch fitting)<br>N3 (ø5/32" One-touch fitting)<br>N7 (ø1/4" One-touch fitting)<br>N9 (ø5/16" One-touch fitting) | 1/4<br>C8 (ø8 One-touch fitting)<br>C10 (ø10 One-touch fitting)<br>N7 (ø1/4" One-touch fitting)<br>N11 (ø3/8" One-touch fitting) |
|                                           |                |                                                                                                                                                                                              |                                                                                                                                  |
| Manifold base weight W (g)<br>n: Stations |                | W = 36n + 64                                                                                                                                                                                 | W = 43n + 64                                                                                                                     |

Note 1) For 10 stations or more (5 stations or more for the 53-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 30.

**Warning** If a resin tubing is used, take precautions against static electricity.

## Flow-rate Characteristics

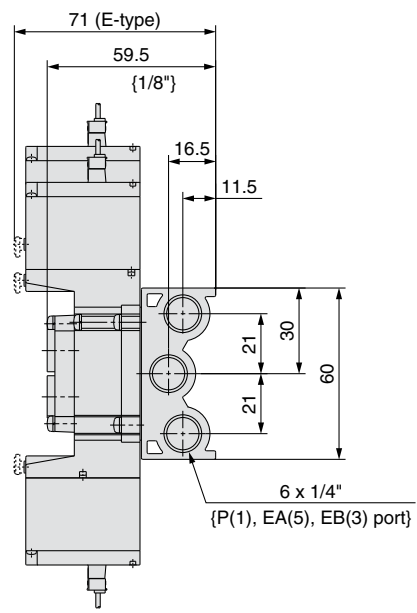
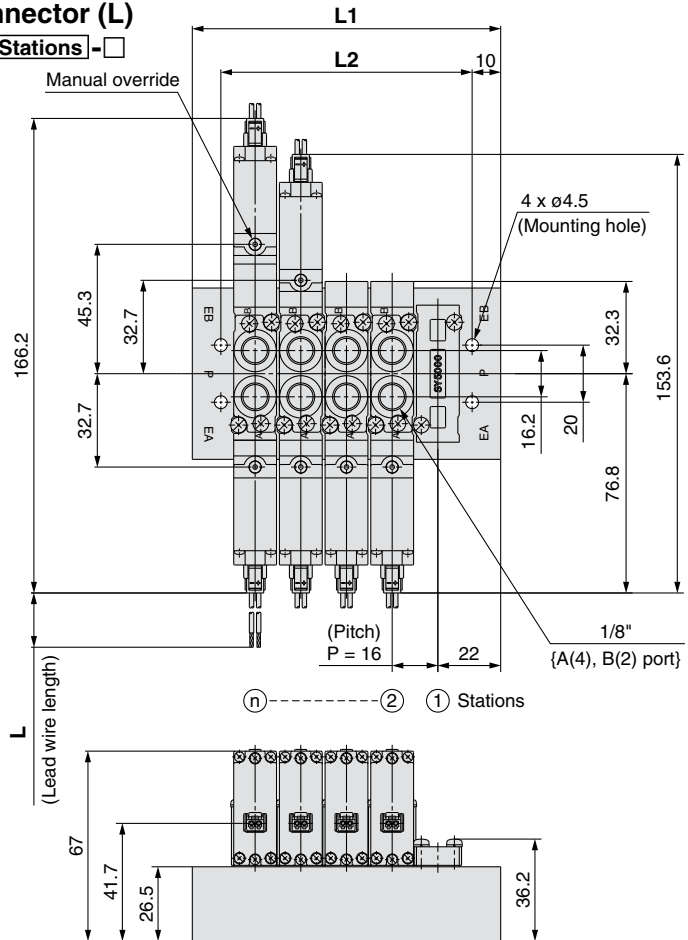
| Model       | Port size              |                | Flow-rate characteristics    |      |      |                              |      |      |
|-------------|------------------------|----------------|------------------------------|------|------|------------------------------|------|------|
|             | 1, 5, 3<br>(P, EA, EB) | 4, 2<br>(A, B) | 1 → 4/2 (P → A/B)            |      |      | 4/2 → 5/3 (A/B → EA/EB)      |      |      |
|             |                        |                | C [dm <sup>3</sup> /(s·bar)] | b    | Cv   | C [dm <sup>3</sup> /(s·bar)] | b    | Cv   |
| 53-SS5Y5-20 | 1/4                    | C8             | 1.9                          | 0.28 | 0.48 | 2.2                          | 0.20 | 0.53 |
| 53-SS5Y7-20 | 1/4                    | C10            | 3.6                          | 0.31 | 0.93 | 3.6                          | 0.27 | 0.88 |

Note) The value is for manifold base with 5 stations and individually operated 2-position type.

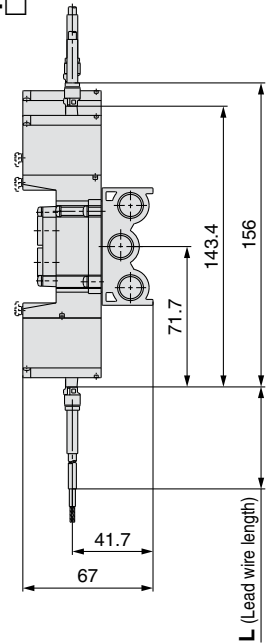
**Dimensions: 53-SY5000**

(mm)

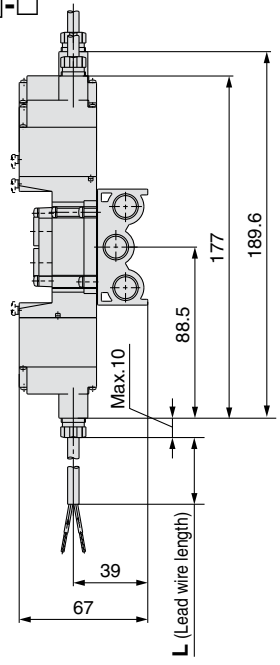
**L-type plug connector (L)**  
**53-SS5Y5-20-**☐Stations



**L-type plug connector with cover (LL)**  
**53-SS5Y5-20-**☐Stations



**Terminal type (TT)**  
**53-SS5Y5-20-**☐Stations



| Stations n | 2 stations | 3 stations | 4 stations | 5 stations | 6 stations | 7 stations | 8 stations | 9 stations | 10 stations | 11 stations | 12 stations | 13 stations | 14 stations | 15 stations | 16 stations | 17 stations | 18 stations | 19 stations | 20 stations |
|------------|------------|------------|------------|------------|------------|------------|------------|------------|-------------|-------------|-------------|-------------|-------------|-------------|-------------|-------------|-------------|-------------|-------------|
| L1         | 60         | 76         | 92         | 108        | 124        | 140        | 156        | 172        | 188         | 204         | 220         | 236         | 252         | 268         | 284         | 300         | 316         | 332         | 348         |
| L2         | 40         | 56         | 72         | 88         | 104        | 120        | 136        | 152        | 168         | 184         | 200         | 216         | 232         | 248         | 264         | 280         | 296         | 312         | 328         |

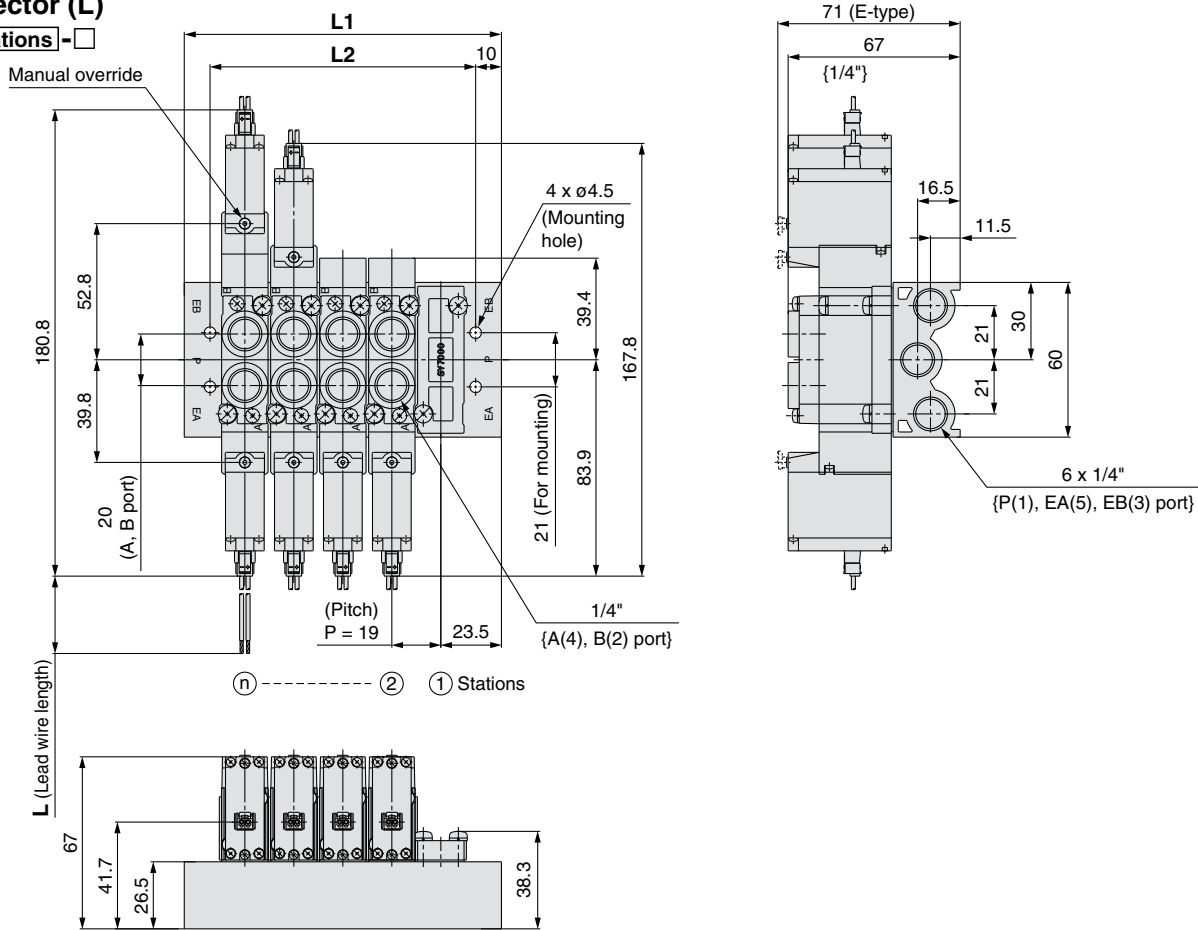
Series 53-SY5000/7000

Dimensions: 53-SY7000

(mm)

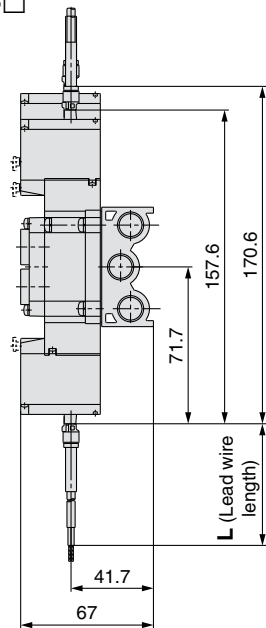
L-type plug connector (L)

53-SS5Y7-20-☐ Stations - ☐



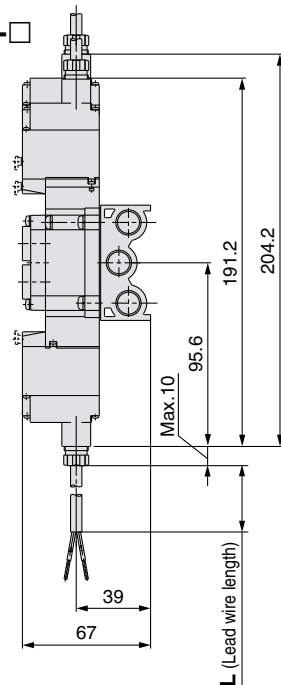
L-type plug connector with cover (LL)

53-SS5Y7-20-☐ Stations - ☐



Terminal type (TT)

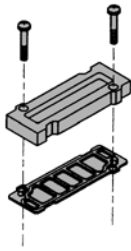
53-SS5Y7-20-☐ Stations - ☐



| Stations n | 2 stations | 3 stations | 4 stations | 5 stations | 6 stations | 7 stations | 8 stations | 9 stations | 10 stations | 11 stations | 12 stations | 13 stations | 14 stations | 15 stations | 16 stations | 17 stations | 18 stations | 19 stations | 20 stations |
|------------|------------|------------|------------|------------|------------|------------|------------|------------|-------------|-------------|-------------|-------------|-------------|-------------|-------------|-------------|-------------|-------------|-------------|
| L1         | 66         | 85         | 104        | 123        | 142        | 161        | 180        | 199        | 218         | 237         | 256         | 275         | 294         | 313         | 332         | 351         | 370         | 389         | 408         |
| L2         | 46         | 65         | 84         | 103        | 122        | 141        | 160        | 179        | 198         | 217         | 236         | 255         | 274         | 293         | 312         | 331         | 350         | 369         | 388         |

## Manifold Options

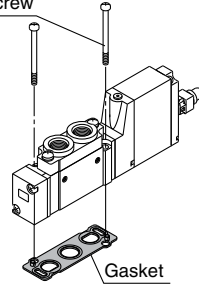
### ■ Type 20 Blanking Plate Assembly



| Series           | Assembly part no. |
|------------------|-------------------|
| <b>53-SY5000</b> | SY5000-26-20A     |
| <b>53-SY7000</b> | SY7000-26-22A     |

### ■ Gasket Assembly Part No.

Round head  
combination screw



| Series           | Gasket assembly |
|------------------|-----------------|
| <b>53-SY5000</b> | SY5000-GS-1     |
| <b>53-SY7000</b> | SY7000-GS-1     |

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

### Caution

**Mounting screw  
tightening torques**

**M3: 0.6 lbf·ft (0.8 N·m)**

**M4: 1.0 lbf·ft (1.4 N·m)**

### Warning

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

Type **41**Type **42**

# 5 Port Solenoid Valve Series 53-SY5000/7000 Base Mounted Manifold Bar Stock Type

## How to Order Manifold

### Type 41/Compact Type

**53 - SS5Y 5 - 41 - 05 - 01**

UL/CSA  
compliant

Manifold series

5 53-SY5000

Stations

|    |             |
|----|-------------|
| 02 | 2 stations  |
| ⋮  | ⋮           |
| 20 | 20 stations |

\* This also includes the number of blanking plate assemblies.

A, B port size  
Thread piping

| Symbol | Port size | Applicable series |
|--------|-----------|-------------------|
| 01     | 1/8       | 53-SY5000         |

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

| Symbol | Port size            | Applicable series |
|--------|----------------------|-------------------|
| C6     | ø6 One-touch fitting | 53-SY5000         |
| C8     | ø8 One-touch fitting |                   |

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

| Symbol | Port size                | Applicable series |
|--------|--------------------------|-------------------|
| N7     | ø1/4" One-touch fitting  | 53-SY5000         |
| N9     | ø5/16" One-touch fitting |                   |

Thread type

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

### Type 42/External Pilot Capable

**53 - SS5Y 5 - 42 - 05 - 02**

UL/CSA  
compliant

Manifold series

5 53-SY5000  
7 53-SY7000

Stations

|    |             |
|----|-------------|
| 02 | 2 stations  |
| ⋮  | ⋮           |
| 20 | 20 stations |

Thread type

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

A, B port size  
Thread piping

| Symbol | Port size | Applicable series      |
|--------|-----------|------------------------|
| 02     | 1/4       | 53-SY5000<br>53-SY7000 |

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

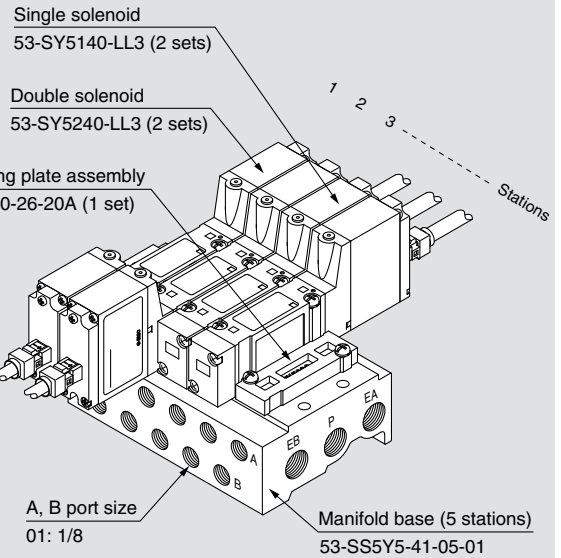
| Symbol | Port size             | Applicable series |
|--------|-----------------------|-------------------|
| C6     | ø6 One-touch fitting  | 53-SY5000         |
| C8     | ø8 One-touch fitting  |                   |
| C10    | ø10 One-touch fitting | 53-SY7000         |

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

| Symbol | Port size                | Applicable series |
|--------|--------------------------|-------------------|
| N7     | ø1/4" One-touch fitting  | 53-SY5000         |
| N9     | ø5/16" One-touch fitting |                   |
| N11    | ø3/8" One-touch fitting  | 53-SY7000         |

## How to Order Valve Manifold Assembly

### Example



53-SS5Y5-41-05-01 ..... 1 set (Type 41, 5 station manifold base part no.)  
 \* 53-SY5240-LL3 ..... 2 sets (Double solenoid part no.)  
 \* 53-SY5140-LL3 ..... 2 sets (Single solenoid part no.)  
 \* SY5000-26-20A ..... 1 set (Blanking plate assembly part no.)

→ 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 tubing is used, take precautions against static electricity.

|                                                                                                           |                                                                                               |
|-----------------------------------------------------------------------------------------------------------|-----------------------------------------------------------------------------------------------|
| Electrical Entry TT<br>Hazardous Location<br>Class I, II, III<br>Division 1<br>Groups A, B, C, D, E, F, G | Electrical Entry L and LL<br>Hazardous Location<br>Class I<br>Division 1<br>Groups A, B, C, D |
|-----------------------------------------------------------------------------------------------------------|-----------------------------------------------------------------------------------------------|



## Warning

Do not install in Zone 0 (as defined in IEC 60079-10-1: 2008) or Zone 20 (as defined in IEC 60079-10-2: 2009)(Refer to page 40 for details)

## How to Order Valve

**53-SY** **5** **2** **40** **-** **LL** **3**

**UL/CSA compliant**

**Series**

|   |           |
|---|-----------|
| 5 | 53-SY5000 |
| 7 | 53-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               |
| A <small>Note)</small> | 4-position dual 3 port valve (N.C./N.C.) |
| B <small>Note)</small> | 4-position dual 3 port valve (N.O./N.O.) |
| C <small>Note)</small> | 4-position dual 3 port valve (N.C./N.O.) |

Note) 4-position dual 3 port valves are available for 53-SY5000 only.

**Pilot type**

|     |                                     |
|-----|-------------------------------------|
| Nil | Internal pilot                      |
| R   | External pilot <small>Note)</small> |

Note) External pilot is not available for 4-position dual 3-port valves.

**Manual override**

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

**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             |

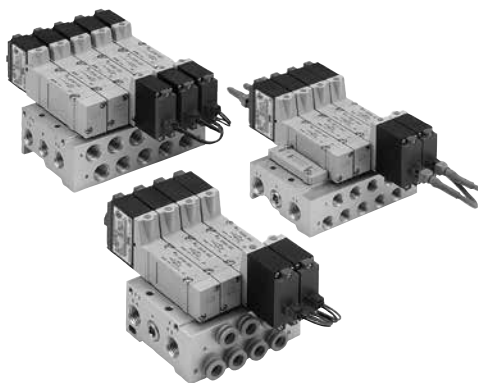
**Electrical entry**

| Symbol                  | Electrical entry                     |
|-------------------------|--------------------------------------|
| L                       | L-type plug connector<br>            |
| LL                      | L-type plug connector with cover<br> |
| TT <small>Note)</small> | Terminal type<br>                    |

Note) The lead wire of TT-type is connected to the terminal block. Use only supplied cable and nut.

## Warning

The solenoid must be connected to a safety barrier located in a non-hazardous area. The safety barrier must meet the specifications listed in the Installation Instructions section.



## Manifold Specifications

| Model                                     |                | 53-SS5Y5-41                                                                                                                   | 53-SS5Y5-42                                                                                                                   | 53-SS5Y7-42                                                         |
|-------------------------------------------|----------------|-------------------------------------------------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------------------------------------------------|---------------------------------------------------------------------|
| Applicable valve                          |                | 53-SY5□40                                                                                                                     |                                                                                                                               | 53-SY7□40                                                           |
| Manifold type                             |                | Single base B mount                                                                                                           |                                                                                                                               |                                                                     |
| P (SUP)/R (EXH)                           |                | Common SUP/EXH                                                                                                                |                                                                                                                               |                                                                     |
| Valve stations                            |                | 2 to 20 stations <sup>Note 1)</sup>                                                                                           |                                                                                                                               |                                                                     |
| A, B port location                        |                | Location                                                                                                                      | Base                                                                                                                          |                                                                     |
|                                           |                | Direction                                                                                                                     | Side                                                                                                                          |                                                                     |
| Port size                                 | P, EA, EB port |                                                                                                                               | 1/4                                                                                                                           |                                                                     |
|                                           | A, B port      | 1/8<br>C6 (ø6 One-touch fitting)<br>C8 (ø8 One-touch fitting)<br>N7 (ø1/4" One-touch fitting)<br>N9 (5/16" One-touch fitting) | 1/4<br>C6 (ø6 One-touch fitting)<br>C8 (ø8 One-touch fitting)<br>N7 (ø1/4" One-touch fitting)<br>N9 (5/16" One-touch fitting) | 1/4<br>C10 (ø10 One-touch fitting)<br>N11 (ø3/8" One-touch fitting) |
|                                           |                |                                                                                                                               |                                                                                                                               |                                                                     |
| Manifold base weight W (g)<br>n: Stations |                | W = 61n + 101                                                                                                                 | W = 79n + 127                                                                                                                 | W = 100n + 151                                                      |

Note 1) For 10 stations or more (5 stations or more for the 53-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 37.

## Flow-rate Characteristics

| Model       | Port size              |                | Flow-rate characteristics    |      |      |                              |      |      |
|-------------|------------------------|----------------|------------------------------|------|------|------------------------------|------|------|
|             | 1, 5, 3<br>(P, EA, EB) | 4, 2<br>(A, B) | 1 → 4/2 (P → A/B)            |      |      | 4/2 → 5/3 (A/B → EA/EB)      |      |      |
|             |                        |                | C [dm <sup>3</sup> /(s·bar)] | b    | Cv   | C [dm <sup>3</sup> /(s·bar)] | b    | Cv   |
| 53-SS5Y5-41 | 1/4                    | C8             | 1.8                          | 0.23 | 0.44 | 1.9                          | 0.16 | 0.45 |
| 53-SS5Y5-42 | 1/4                    | C8             | 1.9                          | 0.20 | 0.46 | 1.9                          | 0.12 | 0.43 |
| 53-SS5Y7-42 | 1/4                    | C10            | 3.0                          | 0.25 | 0.75 | 3.0                          | 0.12 | 0.66 |

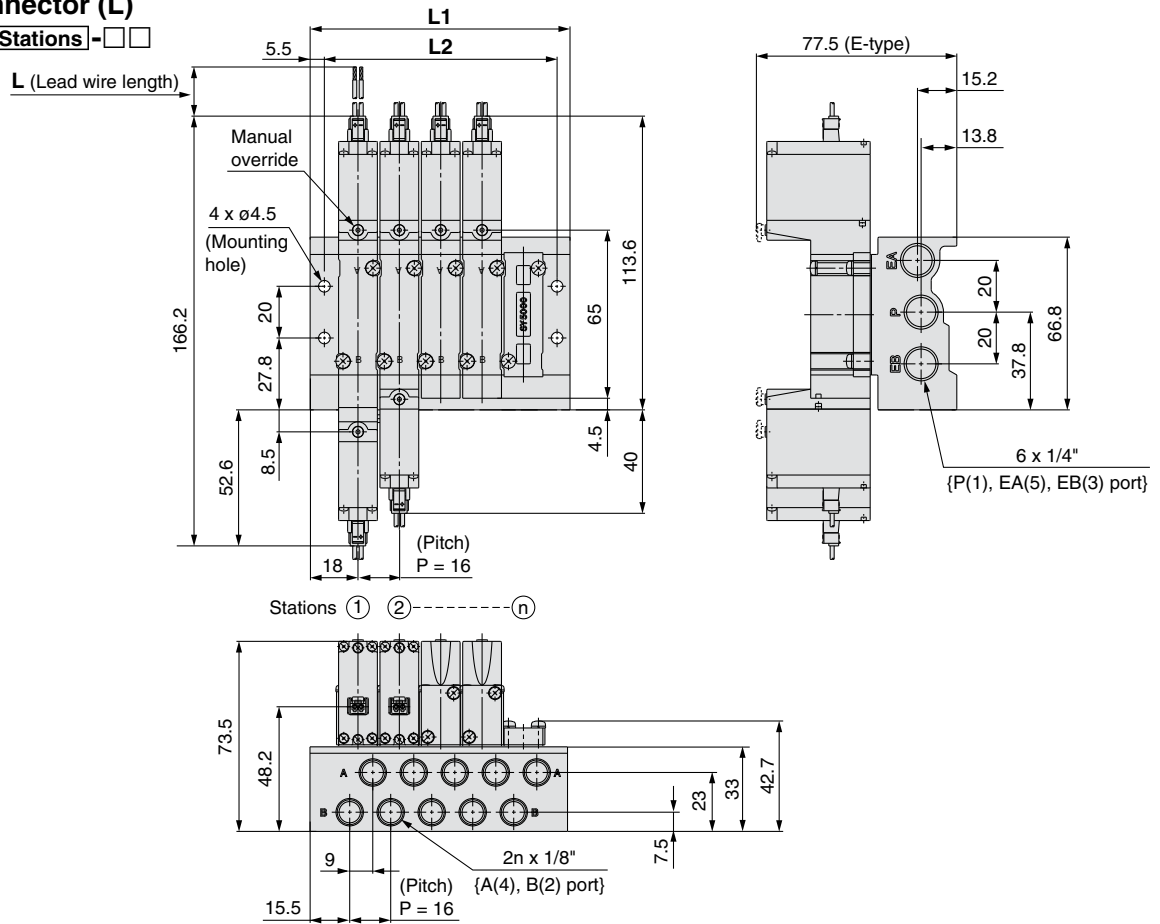
Note) The value is for manifold base with 5 stations and individually operated 2-position type.

## Dimensions: 53-SY5000

(mm)

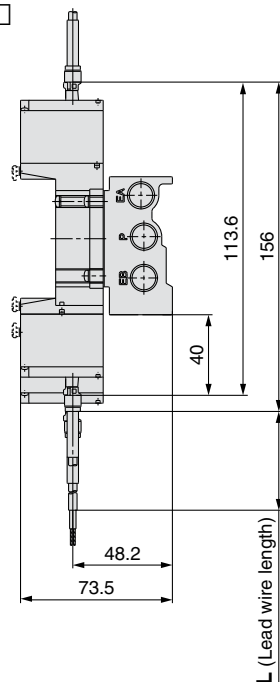
### L-type plug connector (L)

53-SS5Y5-41-☐ Stations - ☐ ☐



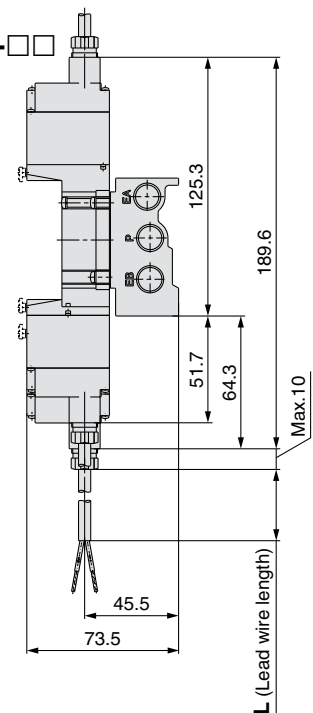
### L-type plug connector with cover (LL)

53-SS5Y5-41-☐ Stations - ☐ ☐



### Terminal type (TT)

53-SS5Y5-41-☐ Stations - ☐ ☐



| Stations n | 2 stations | 3 stations | 4 stations | 5 stations | 6 stations | 7 stations | 8 stations | 9 stations | 10 stations | 11 stations | 12 stations | 13 stations | 14 stations | 15 stations | 16 stations | 17 stations | 18 stations | 19 stations | 20 stations |
|------------|------------|------------|------------|------------|------------|------------|------------|------------|-------------|-------------|-------------|-------------|-------------|-------------|-------------|-------------|-------------|-------------|-------------|
| <b>L1</b>  | 52.5       | 68.5       | 84.5       | 100.5      | 116.5      | 132.5      | 148.5      | 164.5      | 180.5       | 196.5       | 212.5       | 228.5       | 244.5       | 260.5       | 276.5       | 292.5       | 308.5       | 324.5       | 340.5       |
| <b>L2</b>  | 42         | 58         | 74         | 90         | 106        | 122        | 138        | 154        | 170         | 186         | 202         | 218         | 234         | 250         | 266         | 282         | 298         | 314         | 330         |

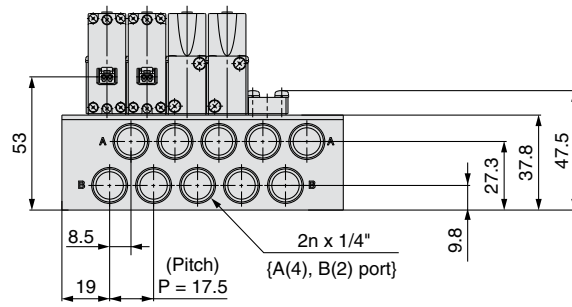
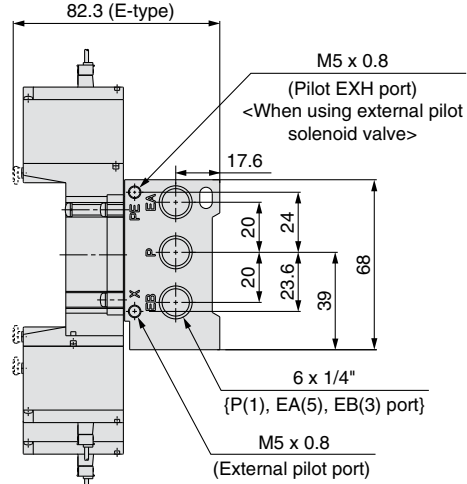
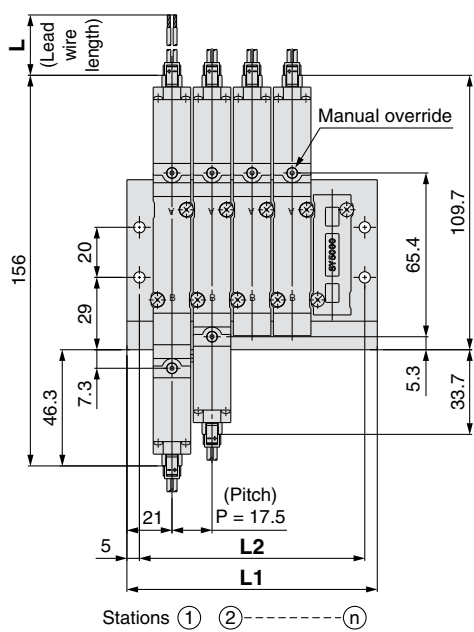
Series 53-SY5000/7000

Dimensions: 53-SY5000

(mm)

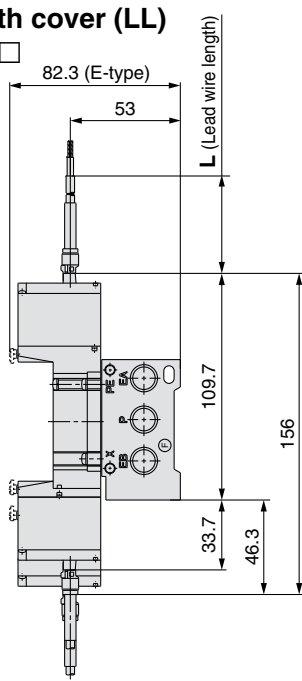
L-type plug connector (L)

53-SS5Y5-42- Stations - □ □



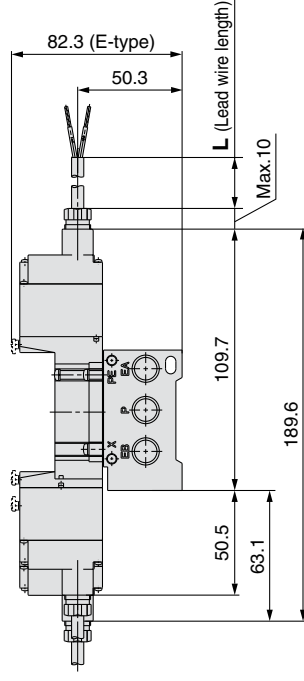
L-type plug connector with cover (LL)

53-SS5Y5-42- Stations - □ □



Terminal type (TT)

53-SS5Y5-42- Stations - □ □



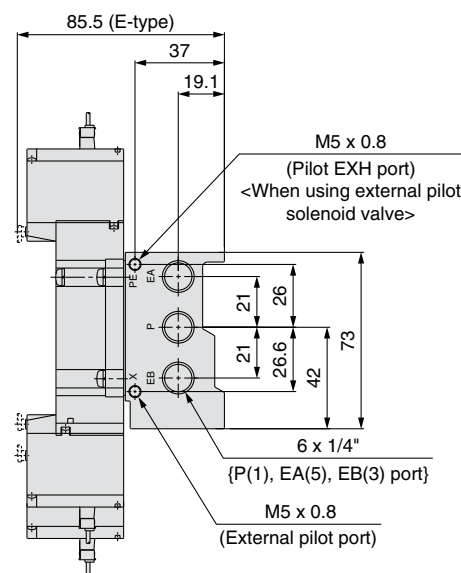
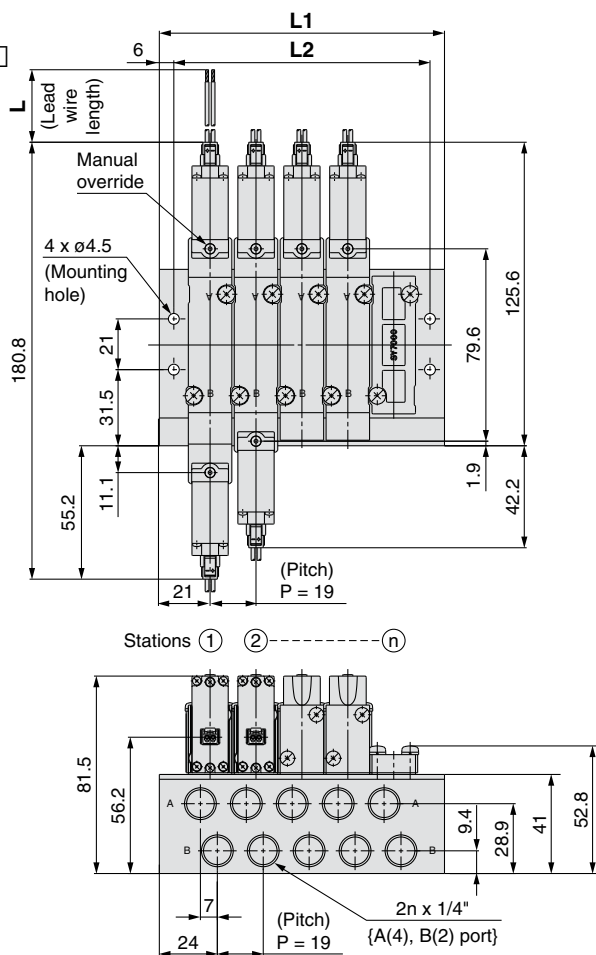
| Stations n | 2 stations | 3 stations | 4 stations | 5 stations | 6 stations | 7 stations | 8 stations | 9 stations | 10 stations | 11 stations | 12 stations | 13 stations | 14 stations | 15 stations | 16 stations | 17 stations | 18 stations | 19 stations | 20 stations |
|------------|------------|------------|------------|------------|------------|------------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

## Dimensions: 53-SY7000

(mm)

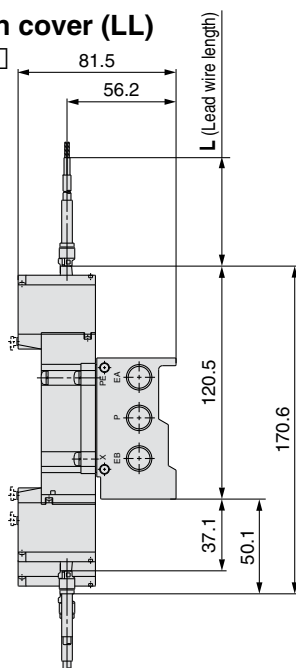
### L-type plug connector (L)

53-SS5Y7-42-**Stations** - □ □



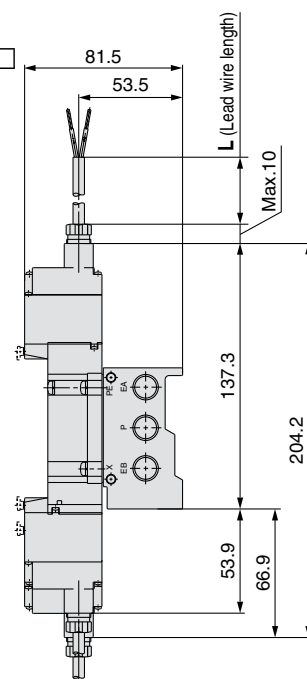
### L-type plug connector with cover (LL)

53-SS5Y7-42-**Stations** - □ □



### Terminal type (TT)

53-SS5Y7-42-**Stations** - □ □

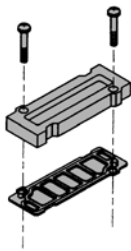


| Stations n | 2 stations | 3 stations | 4 stations | 5 stations | 6 stations | 7 stations | 8 stations | 9 stations | 10 stations | 11 stations | 12 stations | 13 stations | 14 stations | 15 stations | 16 stations | 17 stations | 18 stations | 19 stations | 20 stations |
|------------|------------|------------|------------|------------|------------|------------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

# Series 53-SY5000/7000

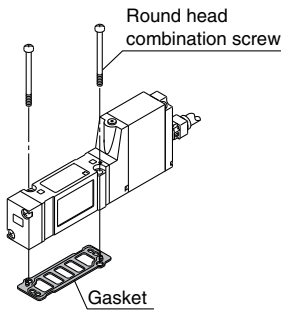
## Manifold Options

### ■ Type 41, 42 Blanking Plate Assembly



| Series    | Assembly part no. |
|-----------|-------------------|
| 53-SY5000 | SY5000-26-20A     |
| 53-SY7000 | SY7000-26-22A     |

### ■ Gasket Assembly Part No.



| Series    | Gasket assembly |
|-----------|-----------------|
| 53-SY5000 | SY5000-GS-2     |
| 53-SY7000 | SY7000-GS-2     |

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

### ⚠ Caution

Mounting screw  
tightening torques

M3: 0.6 lbf·ft (0.8 N·m)  
M4: 1.0 lbf·ft (1.4 N·m)

### ⚠ Warning

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



# Series 53-SY5000/7000/9000 Specific Product Precautions 1

Be sure to read before handling.

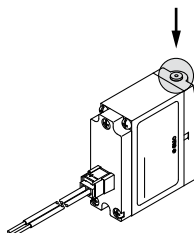
Refer to back cover for Safety Precautions and “Handling Precautions for SMC Products” (M-E03-3) for 3/4/5 Port Solenoid Valves Precautions.

## Manual Override

### Warning

#### ■ Non-locking push type [Standard]

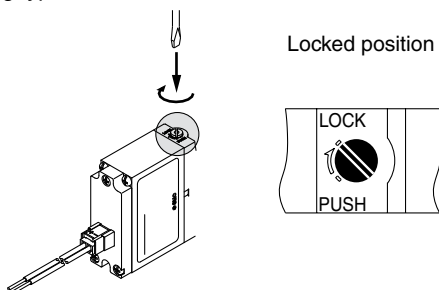
Press in the direction of the arrow.



#### ■ 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.



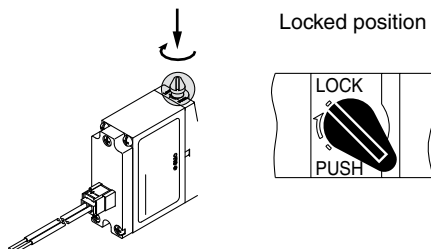
### Caution

When operating the locking type D with a screwdriver, turn it gently using a watchmaker's screwdriver.  
[Torque: Less than 0.073 lbf·ft (0.1 N·m)]

#### ■ Push-turn locking lever type [Type E]

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.



### 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 problems such as air leakage, etc.

## Exhaust Side

### Caution

The 53-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 53-SY5000/7000/9000 Used as a 3-Port Valve

### Caution

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

The 53-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.

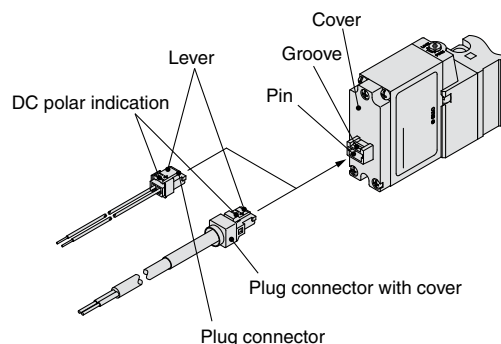
| Plug position       |        | B port | A port |
|---------------------|--------|--------|--------|
| Type of actuation   |        | N.C.   | N.O.   |
| Number of solenoids | Single |        |        |
|                     | Double |        |        |

## How to Use Plug Connector

### Caution

#### 1. Connector attachment/detachment

- To attach a connector, hold the connector between your fingers and insert straight onto the pins of the solenoid valve so that the lever is pushed into the groove and locks.
- To detach a connector, push the lever downward with your thumb, and pull the connector straight out.





# Series 53-SY5000/7000/9000

## Specific Product Precautions 2

Be sure to read before handling.

Refer to back cover for Safety Precautions and “Handling Precautions for SMC Products” (M-E03-3) for 3/4/5 Port Solenoid Valves Precautions.

### One-touch Fittings

#### Warning

1. Please take anti-static precautions appropriate to the use of resin tubing.

#### Caution

The pitch determined for each of the 53-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) Tubing attachment

1. Take tubing having no flaws on its periphery and cut it off at a right angle. When cutting the tubing, use tube cutters TK-1, 2 or 3. Do not use pinchers, nippers or scissors, etc. If cutting is done with tools other than tube 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) Tubing detachment

1. While applying equal pressure when pushing in the collar of the fitting, pull out the tubing. If the collar is not pressed down sufficiently, there will be increased bite on the tubing and it will become more difficult to remove.
2. If the removed tubing is to be used again, cut off the portion which the fitting was attached before reusing. If the tubing is used as is, problems can occur such as air leakage or difficulty in removing the tubing.

### Other Tubing Brands

#### Caution

1. When using other than SMC brand tubing, confirm that the following specifications are satisfied with respect to the tubing outside diameter tolerance.

- |                        |                     |
|------------------------|---------------------|
| 1) Nylon tubing        | within $\pm 0.1$ mm |
| 2) Soft nylon tubing   | within $\pm 0.1$ mm |
| 3) Polyurethane tubing | within $+0.15$ mm   |
|                        | within $-0.2$ mm    |

Do not use tubing that does not meet the above outside diameter tolerances. It may not be possible to connect the tubing and other problems may occur, such as air leakage or the tubing pulling out after being connected.

### Solenoid Valve Mounting

#### Caution

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

| Model     | Thread size | Tightening torque    |
|-----------|-------------|----------------------|
| 53-SY5000 | M3          | 0.6 lbf·ft (0.8 N·m) |
| 53-SY7000 | M4          | 1.0 lbf·ft (1.4 N·m) |
| 53-SY9000 | M3          | 0.6 lbf·ft (0.8 N·m) |



# Series 53-SY5000/7000/9000

## Specific Product Precautions 3

Be sure to read before handling.

Refer to back cover for Safety Precautions and “Handling Precautions for SMC Products” (M-E03-3) for 3/4/5 Port Solenoid Valves Precautions.

### Safety

#### 1. General recommendation

These safety instructions are intended to prevent a hazardous situation and/or equipment damage. These instructions indicate the level of potential hazard by label of “Caution”, “Warning” or “Danger”. To ensure safety, be sure to observe ISO 4414 <sup>Note 1)</sup>, JIS B 8370 <sup>Note 2)</sup> and other safety practices.

Note 1) ISO 4414: Pneumatic fluid power – Recommendations for the application of equipment to transmission and control systems.

Note 2) JIS B 8370: Pneumatic system axiom.

**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.

#### 2. Specific recommendations

##### **Warning**

1. This product enclosure is made of Aluminum alloy. Care must be taken to avoid ignition hazards due to impact or friction.
2. The valves within the scope of this document must not be used with plastic manifolds.
3. Electrical entry TT is approved for Class I, II, III, Division 1, Groups A, B, C, D, E, F, G. Electrical entry L and LL is approved for Class I, Division 1, Groups A, B, C, D.
4. **Do not install in Zone 0 (as defined in IEC 60079-10-1:2008) or Zone 20 (as defined in IEC 60079-10-2:2009)**

Zone 0 area classification: An area in which an explosive gas atmosphere is present continuously or for long periods or frequently.

Zone 20 area classification: A place in which an explosive dust atmosphere, in the form of a cloud of dust in air, is present continuously, or for long periods or frequently.

### Installation

##### **Warning**

- Do not install unless the safety instructions have been read and understood.

#### 1. Electrical connection

##### **Caution**

- When DC power is connected to a solenoid valve equipped with light and/or surge voltage suppressor, check for polarity indications.
- For polarity indications:  
No diode to protect polarity: if polarity connection is wrong, the diode in the valve or switching device at control equipment or power supply may be damaged.  
With diode to protect polarity: if polarity connection is wrong, the valve does not switch.

### Maintenance

##### **Warning**

- Do not make any modification to the product.
- Substitution of components may impair intrinsic safety.
- To prevent a potential ESD hazard, clean with only a damp cloth.

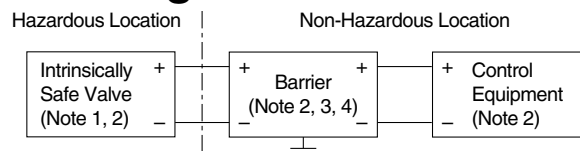
### Limitation of Use

##### **Warning**

- Do not exceed any of the specifications laid out in the “Installation” section of this document or the specific product catalog.
- Refer to “Specific recommendations” section for additional, product specific information.

### Installation Diagram

##### **Warning**



- This product must be connected in accordance with the +/- polarity indication.
- This product must be connected to a certified intrinsically safe circuit (e.g. Zener barrier) for apparatus group IIC with the following maximum values:  
 $U_i = 28\text{ V}$     $I_i = 225\text{ mA}$  (resistively limited)  
 $P_i = 1\text{ W}$     $C_i = 0\text{ nF}$     $L_i = 0\text{ mH}$   
Confirm the solenoid input voltage at the lead wires is 12 VDC 10%.  
The resistance of the solenoid valve is  $R_{20} + 278\text{ } 3\% \text{ Ohm at } 20\text{ }^\circ\text{C}$ .
- Do not bend or pull cables repeatedly.

##### **Warning**

Note)

1. Control equipment connected to the barrier must not use or generate more than 250 V.
2. Installation should be in accordance with Canadian Electrical Code or ANSI/ISA RP12.6 “Installation of Intrinsically Safe Systems for Hazardous (Classified) Locations” and the National Electrical Code or ANSI/NFPA 70.
3. Barrier manufacturer’s installation drawing must be followed when installing this equipment.
4. Multiple barriers are not to be used in parallel unless specifically permitted by the barrier certification.

To insure that intrinsically safe criteria are met, use the below parameters to determine the appropriate barrier.

Note) Ccable and Lcable represents the capacitance and inductance of wire added by the consumer from the intrinsically safe equipment to the barrier. Ccable and Lcable values must be used in the system calculations.

| I.S. Equipment    |        | Barrier              |
|-------------------|--------|----------------------|
| $U_i$             | $\geq$ | $U_o$ (or $V_{oc}$ ) |
| $I_i$             | $\geq$ | $I_o$ (or $I_{sc}$ ) |
| $P_i$             | $\geq$ | $P_o$                |
| $C_i + C_{cable}$ | $\leq$ | $C_o$ (or $C_a$ )    |
| $L_i + L_{cable}$ | $\leq$ | $L_o$ (or $L_a$ )    |

If the cable capacitance and inductance are unknown, use the following values:  $C_{cable} = 60\text{ pF/ft.}$ ,  $L_{cable} = 0.2\text{ } \mu\text{H/ft.}$

If the barrier  $P_o$  is unknown, it may be calculated using the formula  $P_o = (U_o \times I_o)/4$  or  $(V_{oc} \times I_{sc})/4$ .

## Safety Precautions

These Safety Precautions 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.

 **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.

- \*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

#### 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, whichever is first.\*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.

### Caution

#### SMC products are not intended for use as instruments for legal metrology.

Measurement instruments that SMC manufactures or sells have not been qualified by type approval tests relevant to the metrology (measurement) laws of each country. Therefore, SMC products cannot be used for business or certification ordained by the metrology (measurement) laws of each country.

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



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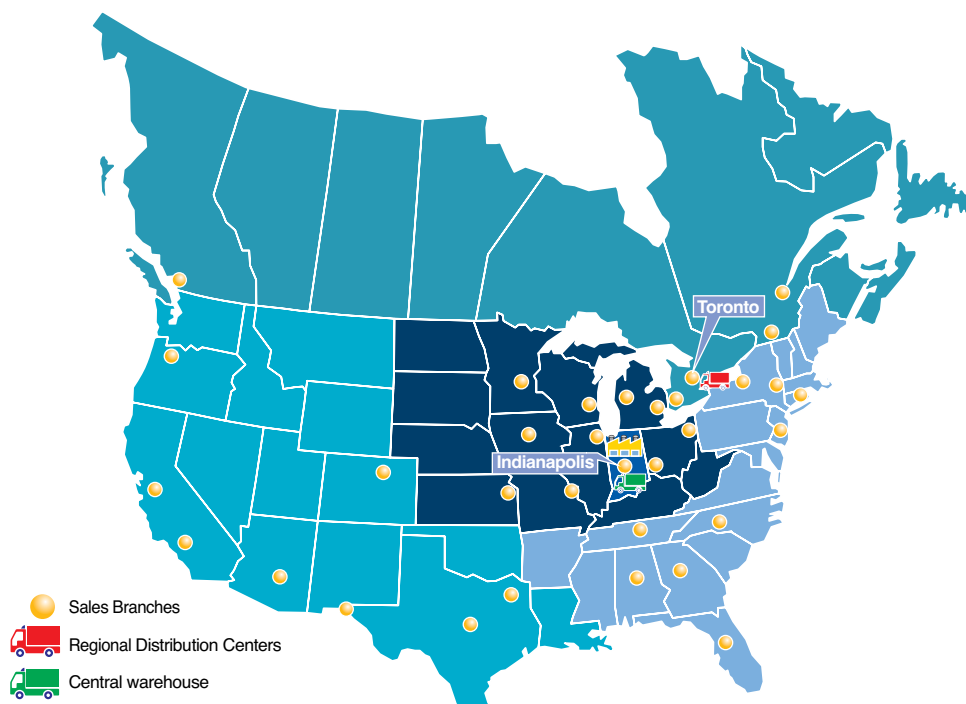
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