

Intrinsically Safe Explosion-proof System

5 Port Solenoid Valve

Series 51-SY5000/7000/9000

Body Ported

Single Unit

How to Order

51-SY 5 1 20-A LL 3 - 01 - -

Series

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

Explosion-proof

51	Intrinsically safe explosion-proof structure
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Type of actuation

1	2-position single (A)4 2(B) (EA)5 1 3(EB) (P)
2	2-position double (A)4 2(B) (EA)5 1 3(EB) (P)
3 Note)	3-position closed center (A)4 2(B) (EA)5 1 3(EB) (P)
4 Note)	3-position exhaust center (A)4 2(B) (EA)5 1 3(EB) (P)
5 Note)	3-position pressure center (A)4 2(B) (EA)5 1 3(EB) (P)

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

Thread type

Nil	Rc
F	G
N	NPT
T	NPTF

A, B port size
Thread piping

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

One-touch fitting (Metric size) Note)

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

Bracket

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

* The 51-SY9000 has no bracket.

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

Manual override

Nil: Non-locking push type 	D: Push-turn locking slotted type 	E: Push-turn locking lever type
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System Note 1) Note 2) Note 3)

A	Z728.H (51-SYE100-A) Model certificate number: TC14452
B	MTL728P + (51-SYE100-B) Model certificate number: TC14453
F	KFD0-SD2-Ex1.1065 (51-SYE100-F) Model certificate number: TC19711

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

Note 2) If the barrier is not necessary due to valve replacement etc, enter O after the system symbol.
Example) 51-SY5120-AQLL3-01

Note 3) For this product, the barrier and the valve as a set are certified as a system, so please be aware of the following.

- For this product, both the barrier and the valve have an SMC model certification label with a model certification number listed on it. Be sure to use only a barrier and a valve whose numbers match.
- If an SMC model certification label has not been stuck on the product, or if the model certification numbers do not match, the product cannot be said to be an intrinsically safe explosion-proof system. Therefore, be sure to use only a barrier purchased from SMC.

Electrical entry

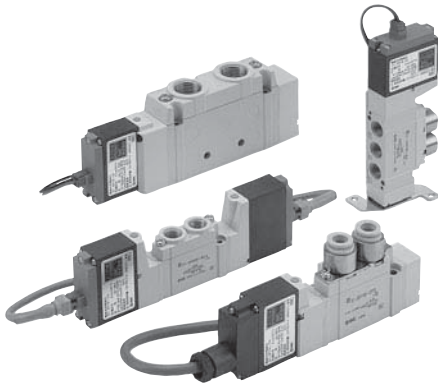
Symbol	Electrical entry
L	L-type plug connector
LL	L-type plug connector with cover
TT Note)	With IP65 compliant cable Ground nut

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

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

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



Specifications

Series		51-SY5000	51-SY7000	51-SY9000
Fluid		Air		
Internal pilot operating pressure range (MPa)	2-position single	0.15 to 0.7		
	2-position double	0.1 to 0.7		
	3-position	0.2 to 0.7		
Ambient and fluid temperature (°C)		-10 to 50 (No freezing)		
Max. operating frequency (Hz)	2-position single, double	5		
	3-position	3		
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/s²) <small>Note)</small>		150/30		
Enclosure		IP30 (L-type), IP40 (LL-type), IP65 (TT-type)		



* Based on IEC60529

Note) Impact resistance: No malfunction occurred when it is tested in the axial direction and at the right angles to the main valve and armature in both energized and de-energized states every once for each condition. (Values at the initial period)

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

Solenoid Specifications

Electrical entry	L-type plug connector (L), L-type plug connector with cover (LL), Terminal type (TT)
Coil rated voltage	12 VDC
Allowable voltage fluctuation	-10% to +10% of rated voltage
Coil insulation type	Class B
Power consumption	0.52 W (at rated voltage)

Intrinsically Safe Explosion-proof System Specifications

Type of explosion-proof structure	Intrinsically safe explosion-proof structure (ia) <small>Note 1)</small>
Applicable gas or ignition temperature of steam and explosion class	IIBT4
Voltage to barrier	24 VDC (rated voltage of system) <small>Note 2) Note 3)</small>
Tolerant voltage fluctuation	Refer to the barrier dimensions on page 41 and 42.

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

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

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

Response Time



Note) Based on dynamic performance test, JIS B8419: 2010.
(Coil temperature: 20°C, system A, B, F at 24 VDC)


Type of actuation	Response time (ms) (at 0.5 MPa)		
	51-SY5000	51-SY7000	51-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	—

Series 51-SY5000/7000/9000

Flow-rate Characteristics

Series 51-SY5000

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


 Note) []: Normal position

Series 51-SY9000

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

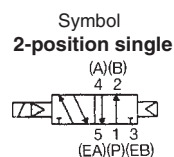
Series 51-SY7000

Valve model	Type of actuation		Port size		Flow-rate characteristics <small>Note)</small>							
			1, 5, 3 (P, EA, EB)	4, 2 (A, B)	1→4/2 (P→A/B)			4/2→5/3 (A/B→EA/EB)				
					C(dm ³ /s-bar)	b	Cv	C(dm ³ /s-bar)	b	Cv		
51-SY7 □20-□ -02	2-position	Single	1/4	C10 ø10 (one-touch fitting)	4.1	0.23	0.93	3.3	0.33	0.81		
		Double										
	3-position	Closed center			2.9	0.31	0.70	2.4	0.38	0.63		
		Exhaust center										
		Pressure center			2.5	0.39	0.65	3.4 [2.1]	0.35 [0.38]	0.82 [0.54]		
		Exhaust center										
2-position	Single	3.2			0.26	0.77	3.2	0.37	0.82			
	Double											
51-SY7 □20-□ -C8	2-position	Single			1/4	C8 ø8 (one-touch fitting)	2.6	0.24	0.63	2.4	0.31	0.62
		Double										
	3-position	Closed center					2.4	0.25	0.57	2.6 [1.9]	0.42 [0.46]	0.70 [0.56]
		Exhaust center										
		Pressure center	3.3 [2.4]	0.28 [0.22]			0.78 [0.57]	2.2	0.34	0.60		
		Exhaust center										
2-position	Single	3.8	0.26	0.86			3.2	0.34	0.82			
	Double											
51-SY7 □20-□ -C10	2-position	Single	1/8	C10 ø10 (one-touch fitting)			2.8	0.27	0.67	2.4	0.21	0.59
		Double										
	3-position	Closed center					2.5	0.25	0.59	2.7 [2.0]	0.38 [0.38]	0.70 [0.56]
		Exhaust center										
		Pressure center			3.8 [2.4]	0.25 [0.31]	0.89 [0.61]	2.3	0.38	0.61		
		Exhaust center										

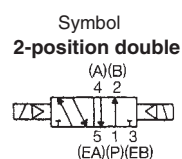
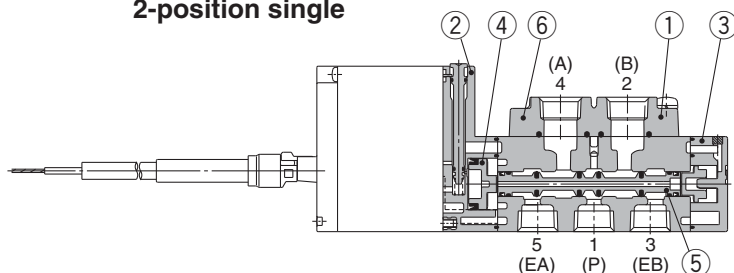
 Note) []: Normal position

Construction

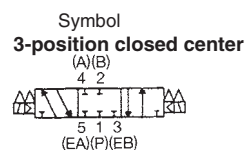
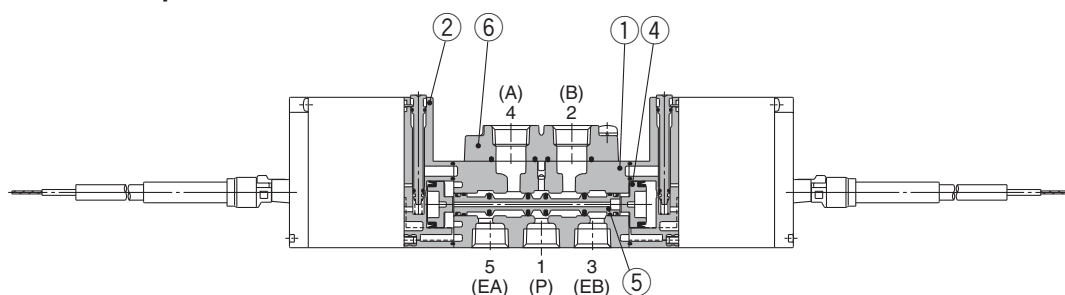
Series SY



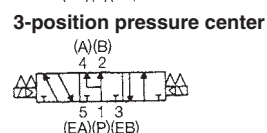
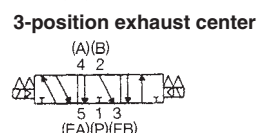
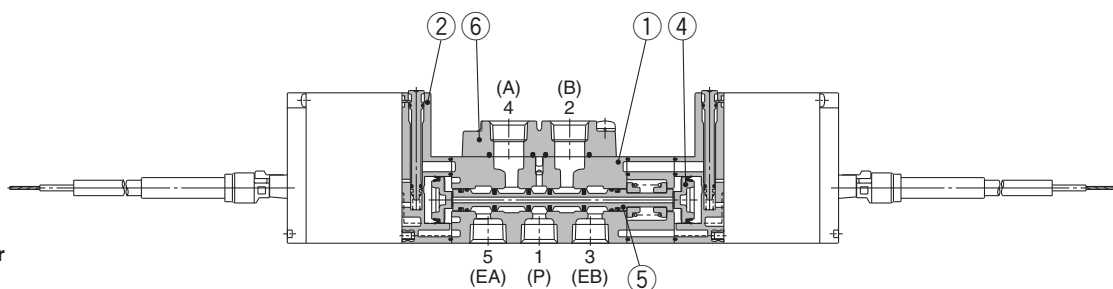
2-position single



2-position double



3-position closed center/exhaust center/pressure center



(This figure shows a closed center type.)

Component Parts

No.	Description	Material	Note
1	Body	Aluminum die-casted	White
2	Adapter plate	Resin	White (51-SY9000: Gray)
3	End plate	Resin	White
4	Piston	Resin	—
5	Spool valve assembly	Aluminum, HNBR	—

Replacement Parts

No.	Description	Part no.
6	Port block assembly	Refer to "How to Order Port Block Assembly" on page 5.

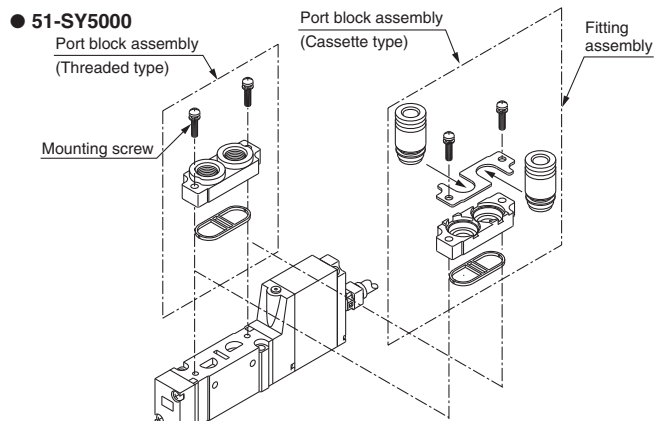
Bracket Assembly Part No.

Description	Part no.
Bracket (for F1)	SX ² 000-16-2A (with mounting screw)
Bracket (for F2)	SX ² 000-16-1A (with mounting screw)

* The 51-SY9000 has no bracket.

How to Change Port Block Assembly

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



Caution

Mounting screw tightening torques

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

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

Series 51-SY5000/7000/9000

How to Order Port Block Assembly

SY 000-6A-

• **Series**

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

• **Thread type**

Nil	Rc
F	G
N	NPT
T	NPTF

• **A, B port size**

Thread piping

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

One-touch fitting (Metric size)

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

One-touch fitting (Inch size)

Symbol	Port size	Applicable series
N3	ø5/32" one-touch fitting	51-SY5000
N7	ø1/4" one-touch fitting	
N9	ø5/16" one-touch fitting	
N9	ø5/16" one-touch fitting	51-SY7000
N11	ø3/8" one-touch fitting	
N9	ø5/16" one-touch fitting	51-SY9000
N11	ø3/8" one-touch fitting	

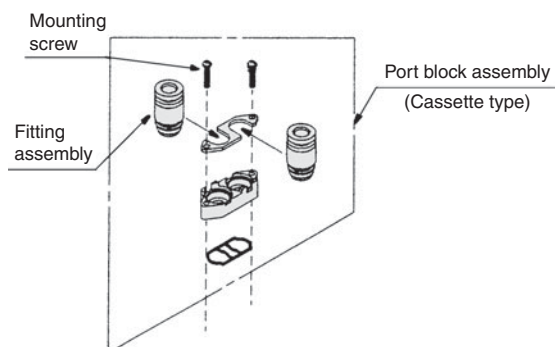
* Only the fitting assembly replacement is also possible.

Metric size

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

Inch size

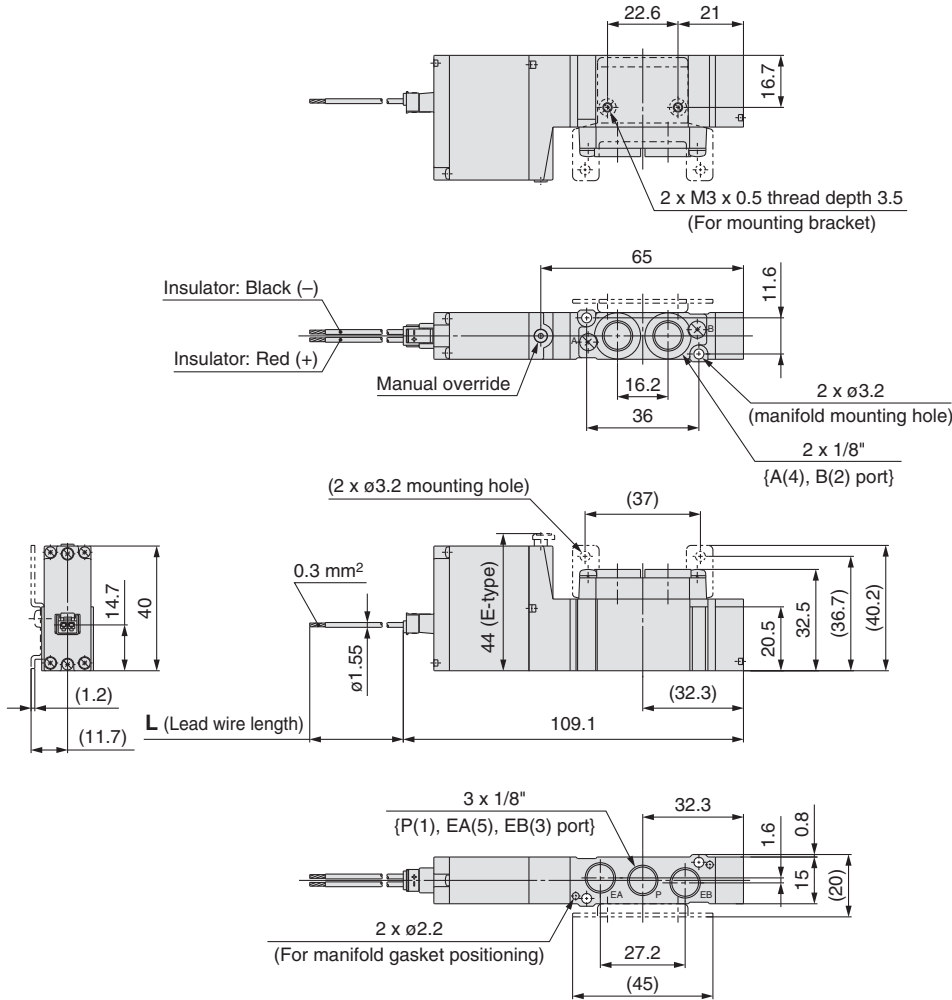
Series	Port size	Part number
51-SY5000	ø5/32" one-touch fitting	VVQ1000-51A-N3
	ø1/4" one-touch fitting	VVQ1000-51A-N7
	ø5/16" one-touch fitting	VVQ1000-51A-N9
51-SY7000	ø5/16" one-touch fitting	VVQ2000-51A-N9
	ø3/8" one-touch fitting	VVQ2000-51A-N11
51-SY9000	ø5/16" one-touch fitting	VVQ4000-50B-N9
	ø3/8" one-touch fitting	VVQ4000-50B-N11



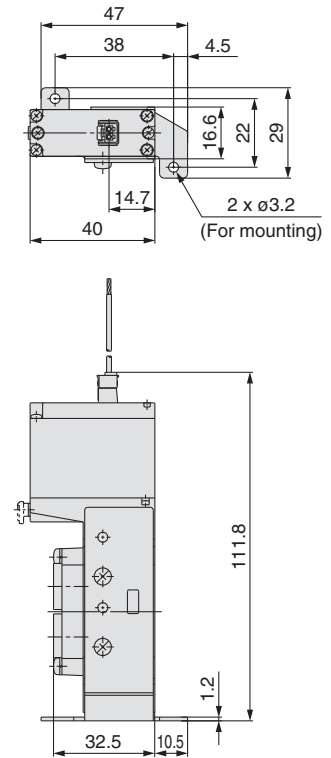
Warning If a resin tube is used, take measures against static electricity.

Dimensions: 51-SY5000

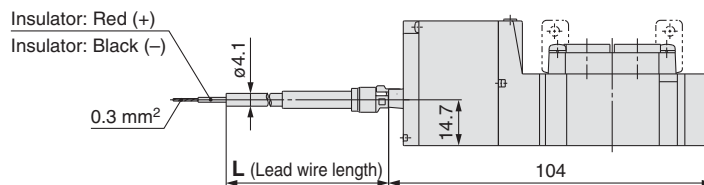
2-position single
L-type plug connector (L)
51-SY5120-□L□□-01□ (-F2)



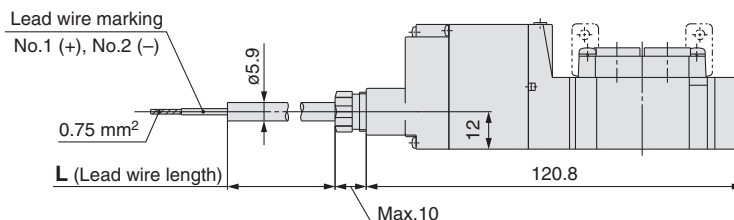
With foot bracket
51-SY5120-□L□□-01□-F1



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



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



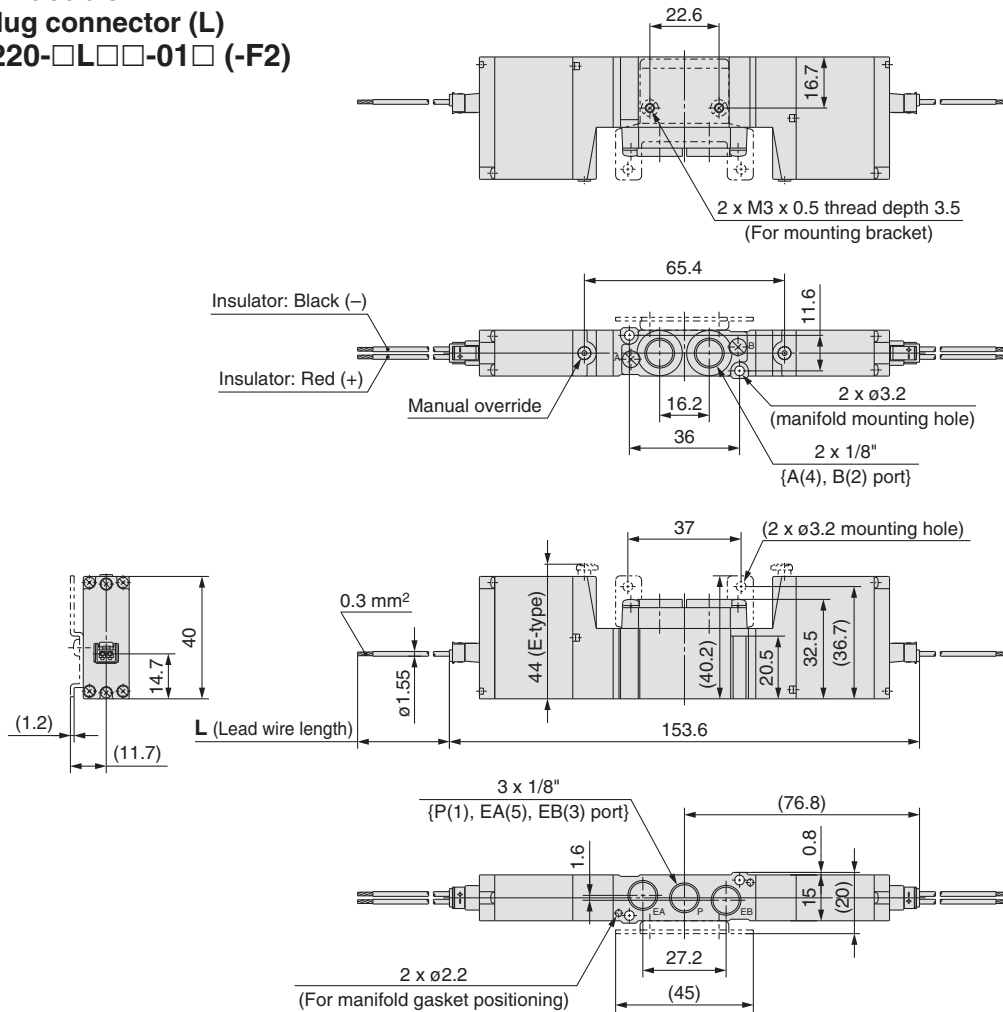
Series 51-SY5000/7000/9000

Dimensions: 51-SY5000

2-position double

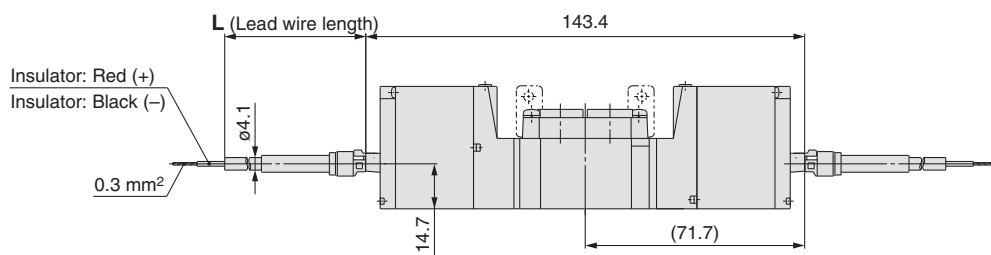
L-type plug connector (L)

51-SY5220-□L□□-01□ (-F2)



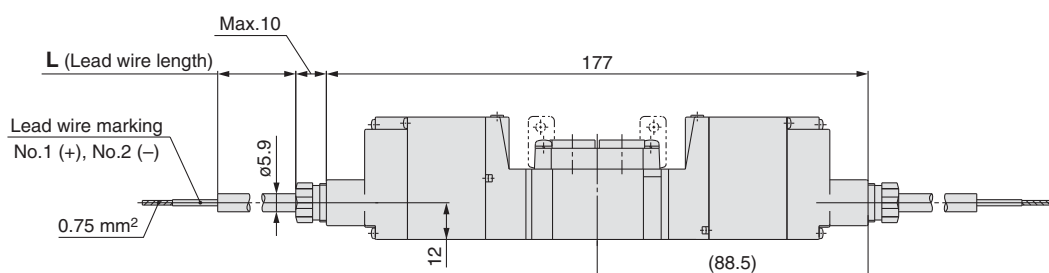
L-type plug connector with cover (LL)

51-SY5220-□LL□□-01□ (-F2)



With IP65 compliant cable (TT)

51-SY5220-□TT□□-01□ (-F2)

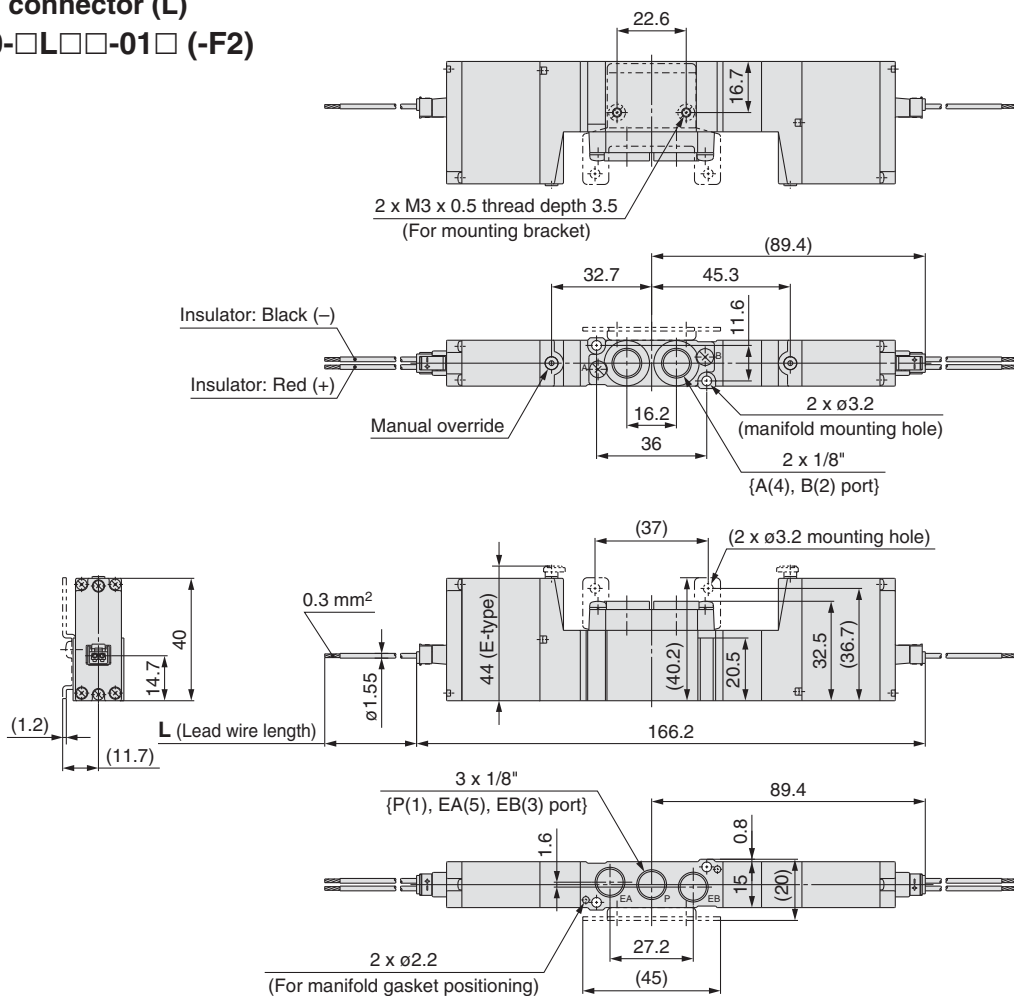


Dimensions: 51-SY5000

3-position closed center/exhaust center/pressure center

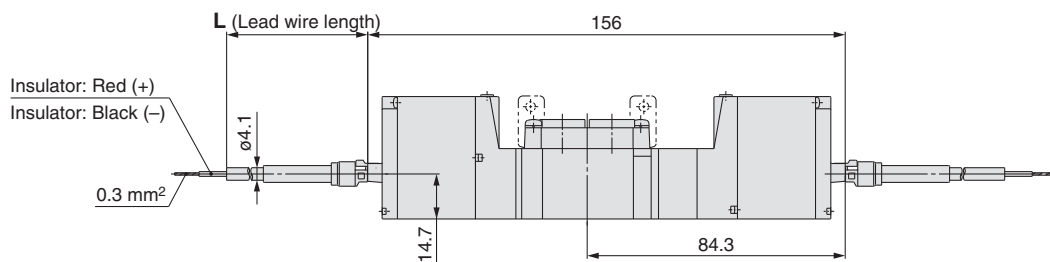
L-type plug connector (L)

51-SY5³/₄20-□L□□-01□ (-F2)



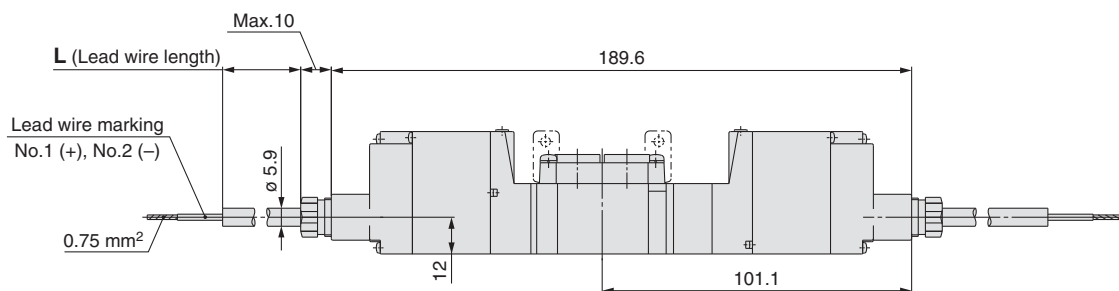
L-type plug connector with cover (LL)

51-SY5³/₄20-□LL□□-01□ (-F2)



With IP65 compliant cable (TT)

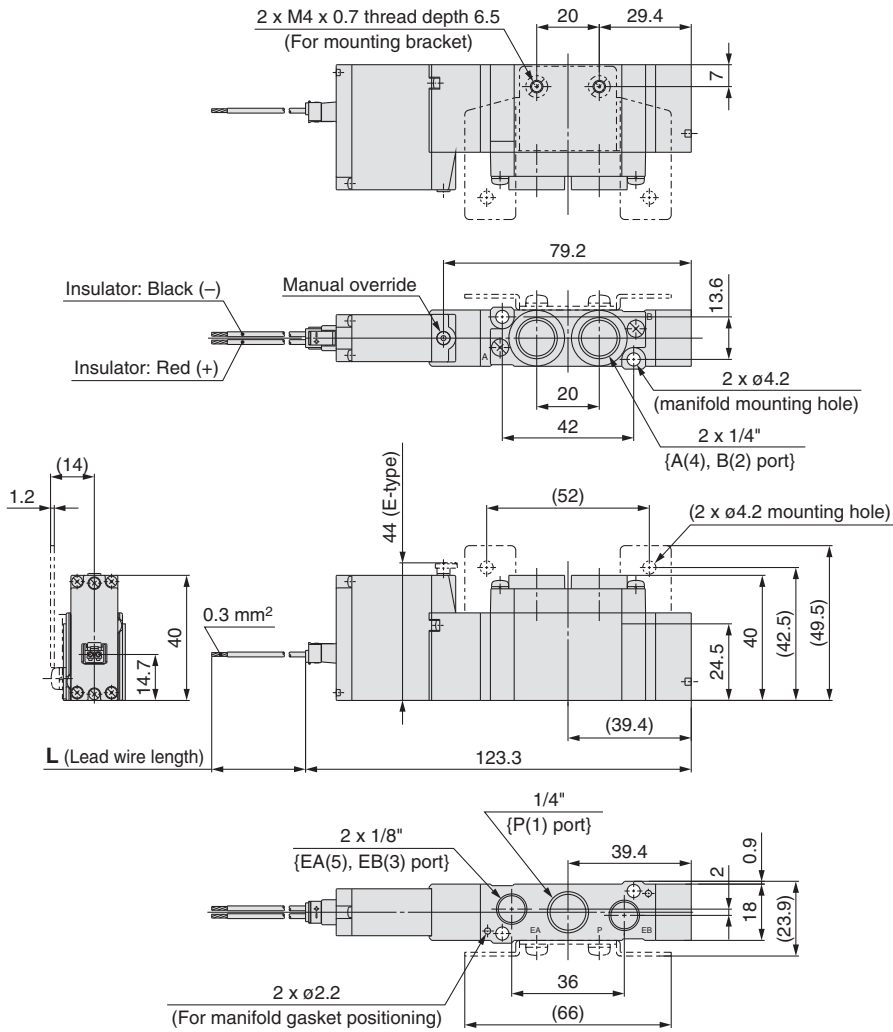
51-SY5³/₄20-□TT□□-01□ (-F2)



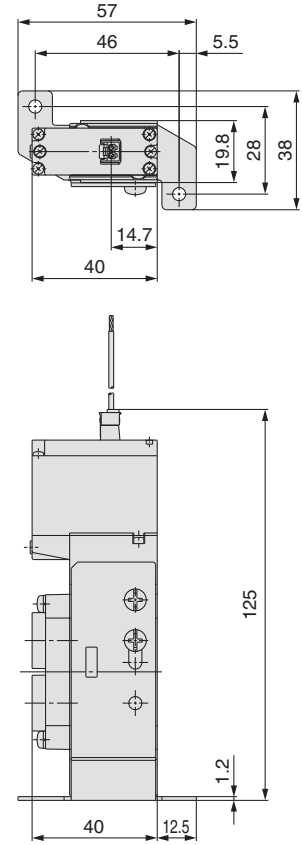
Series 51-SY5000/7000/9000

Dimensions: 51-SY7000

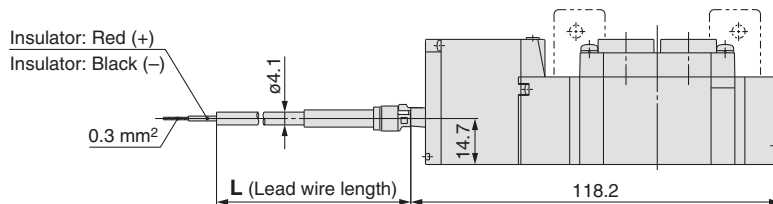
2-position single L-type plug connector (L) 51-SY7120-□L□□-02□ (-F2)



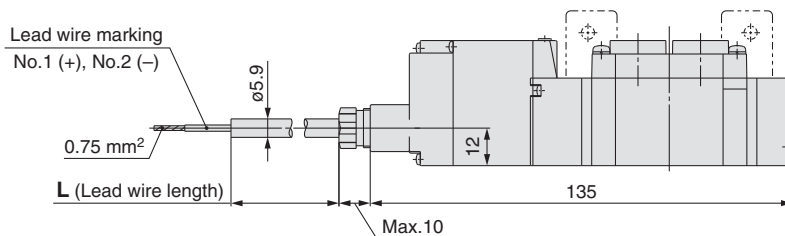
With foot bracket 51-SY7120-□L□□-02□-F1



L-type plug connector with cover (LL) 51-SY7120-□LL□□-02□ (-F2)



With IP65 compliant cable (TT) 51-SY7120-□TT□□-02□ (-F2)

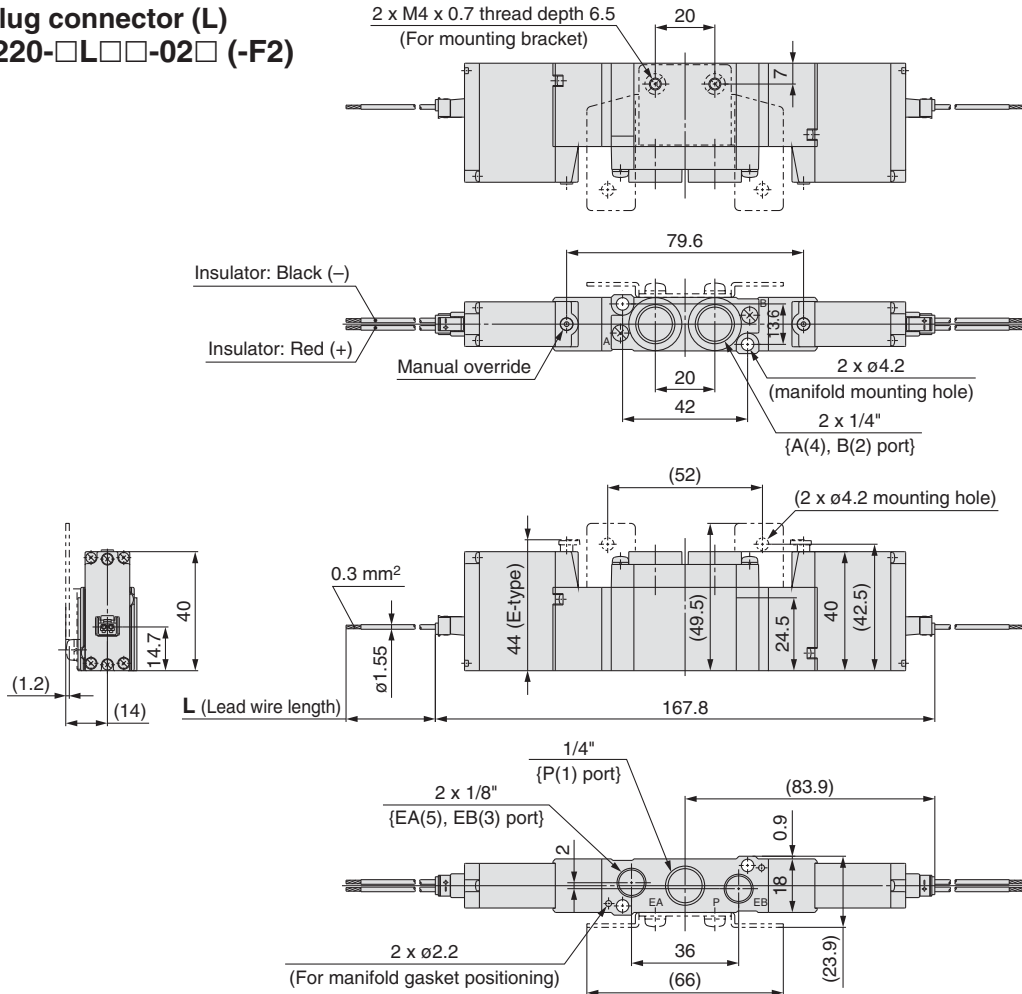


Dimensions: 51-SY7000

2-position double

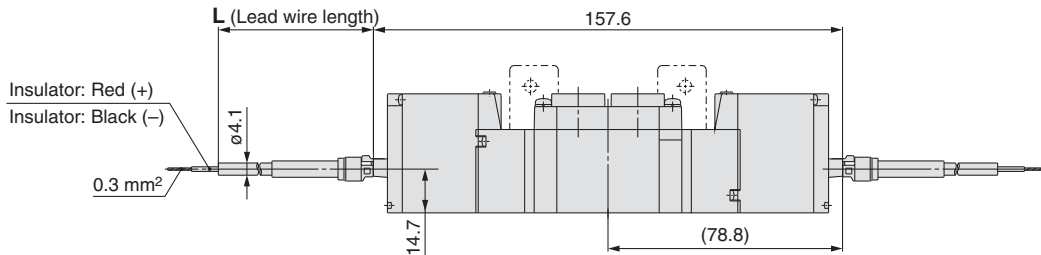
L-type plug connector (L)

51-SY7220-□L□□-02□ (-F2)



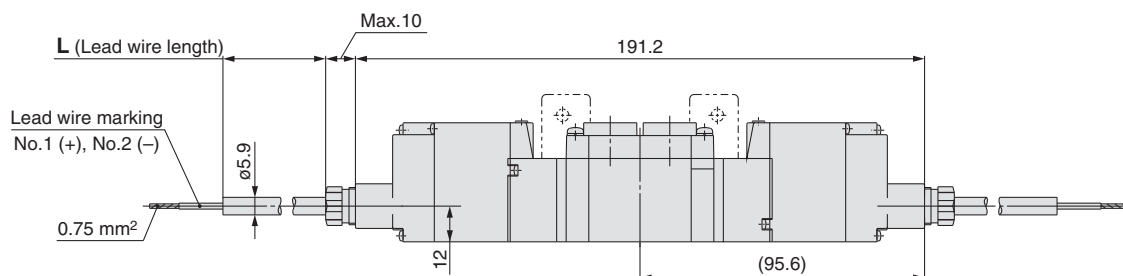
L-type plug connector with cover (LL)

51-SY7220-□LL□□-02□ (-F2)



With IP65 compliant cable (TT)

51-SY7220-□TT□□-02□ (-F2)



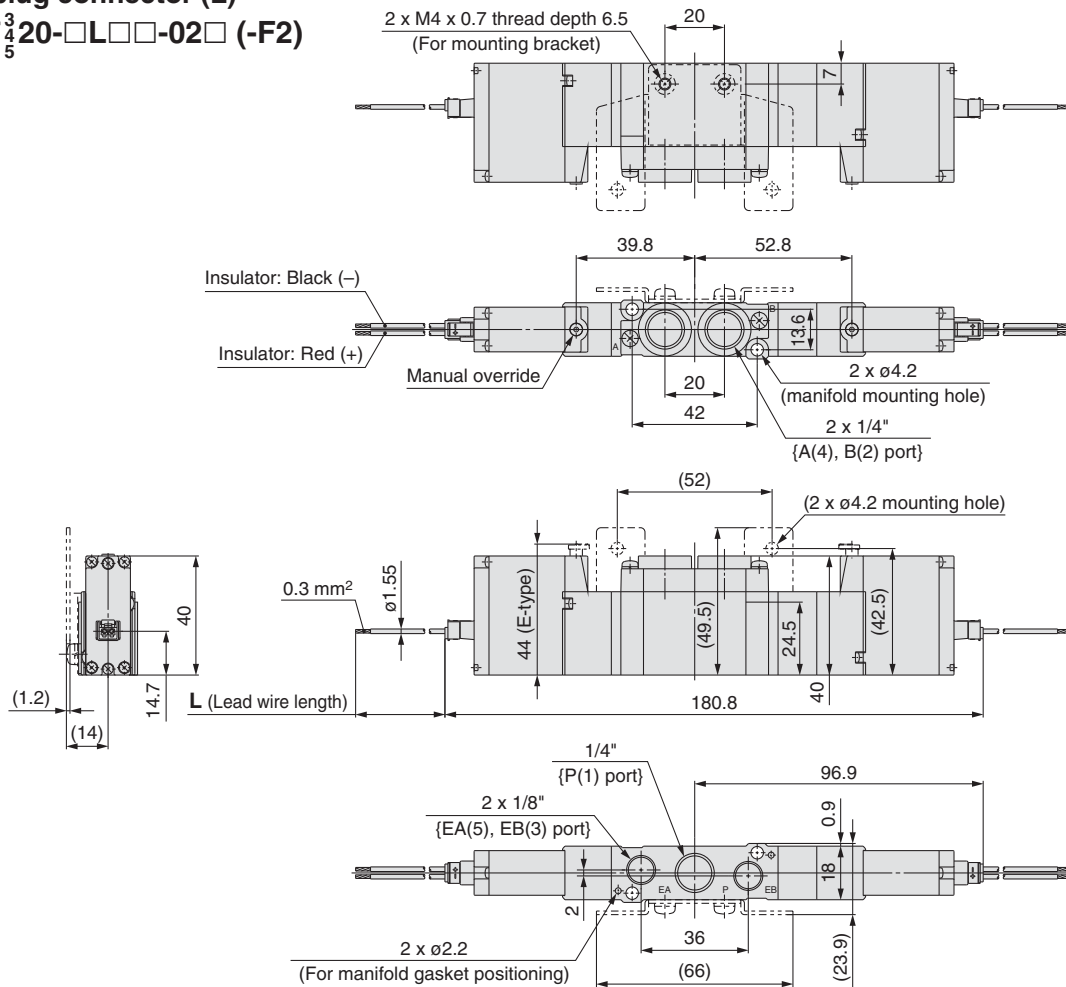
Series 51-SY5000/7000/9000

Dimensions: 51-SY7000

3-position closed center/exhaust center/pressure center

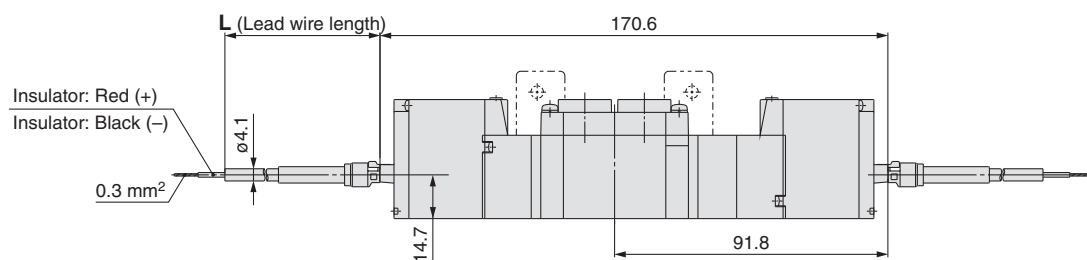
L-type plug connector (L)

51-SY7³/₄20-□L□□-02□ (-F2)



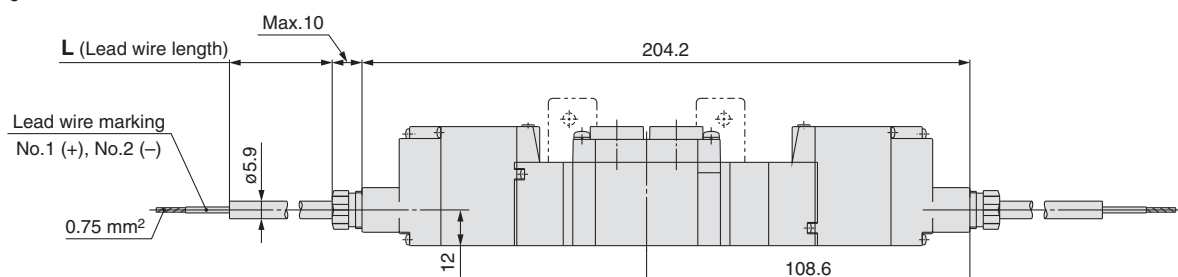
L-type plug connector with cover (LL)

51-SY7³/₄20-□LL□□-02□ (-F2)



With IP65 compliant cable (TT)

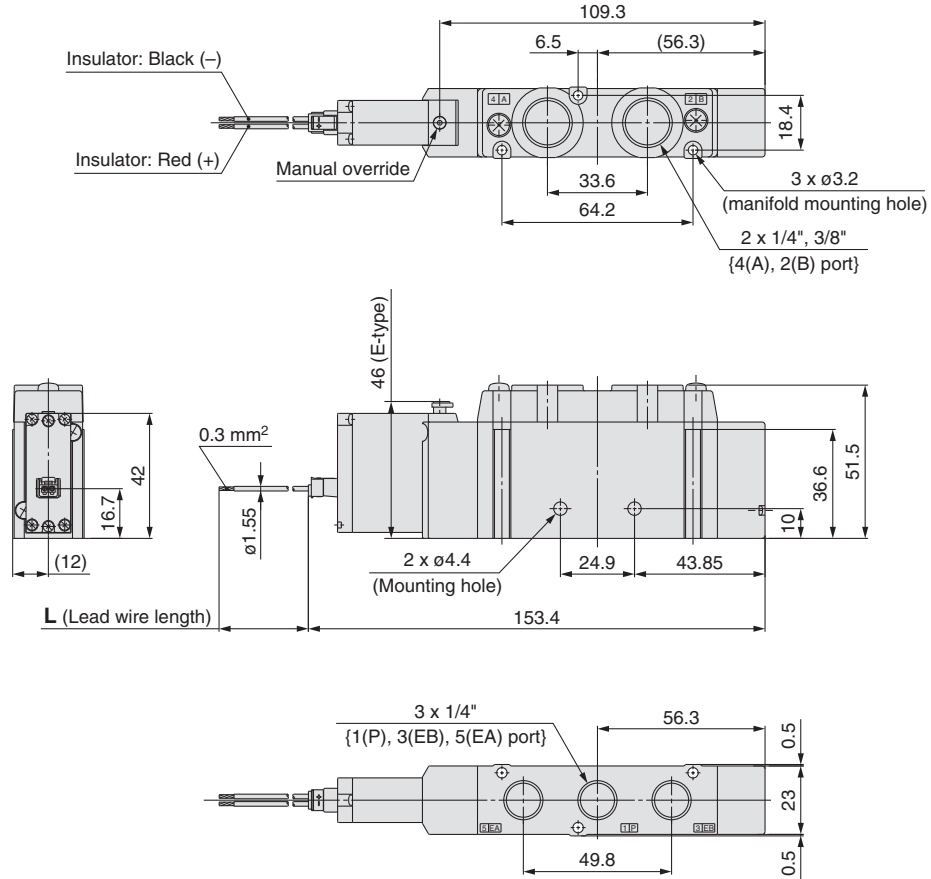
51-SY7³/₄20-□TT□□-02□ (-F2)



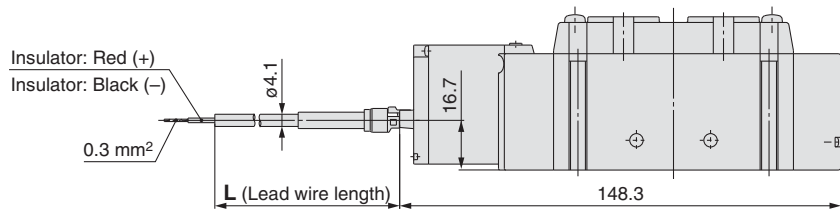
Body Ported *Series 51-SY5000/7000/9000*

Dimensions: 51-SY9000

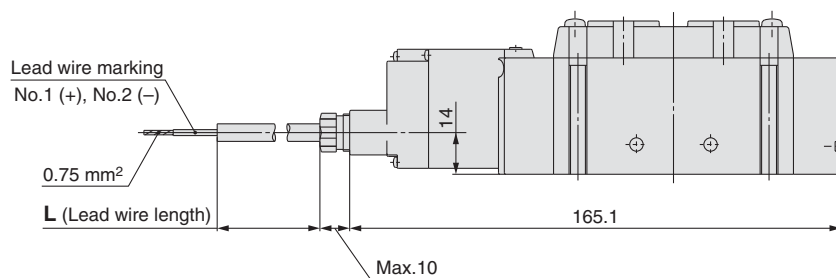
2-position single
L-type plug connector (L)
51-SY9120-□L□□-02□



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



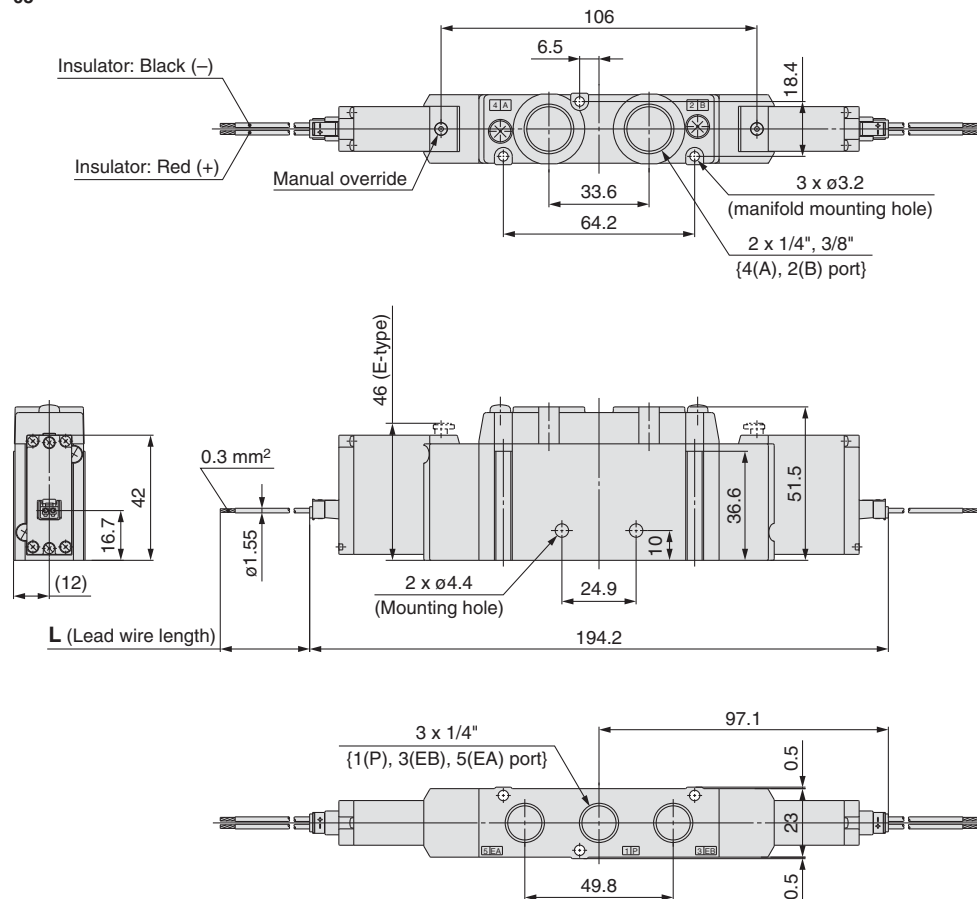
With IP65 compliant cable (TT)
51-SY9120-□TT□□-02□



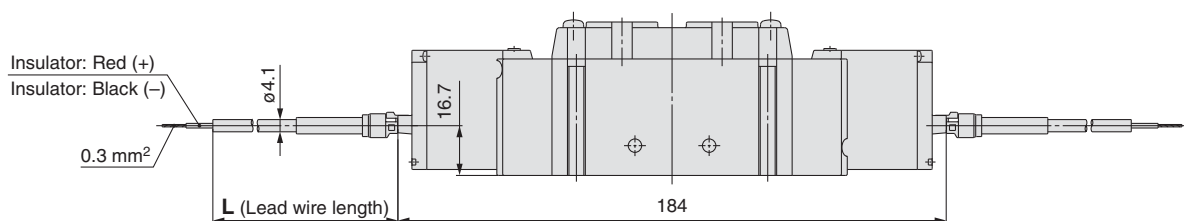
Series 51-SY5000/7000/9000

Dimensions: 51-SY9000

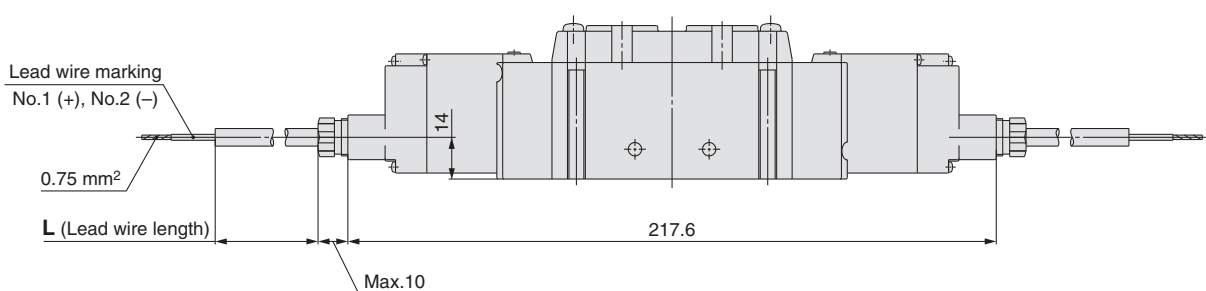
2-position double
L-type plug connector (L)
51-SY9220-□L□□-02□



L-type plug connector with cover (LL)
51-SY9220-□LL□□-02□



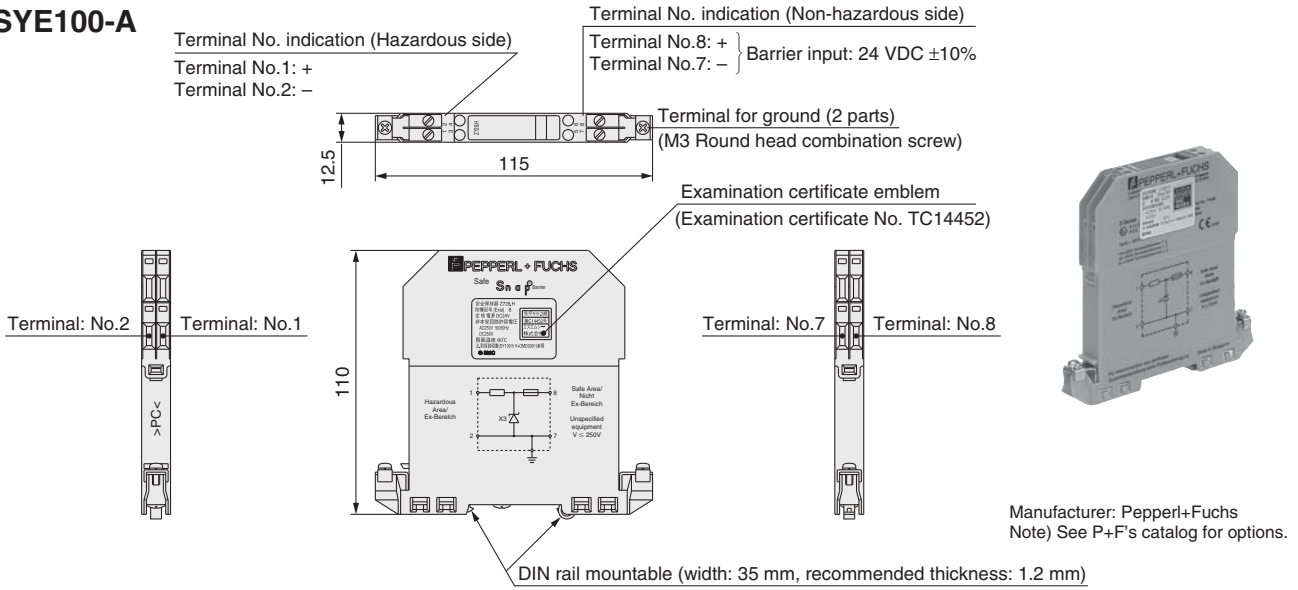
With IP65 compliant cable (TT)
51-SY9220-□TT□□-02□



Series 51-SY

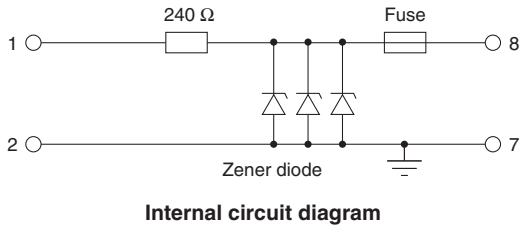
Zener Diode Barrier Dimensions

51-SYE100-A

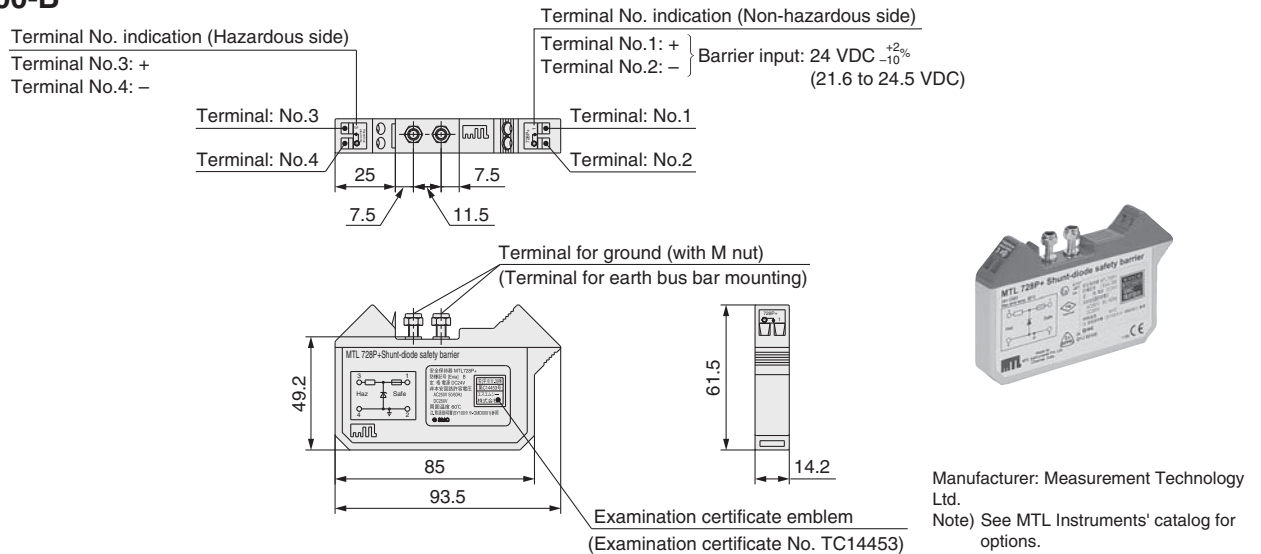


⚠ Caution

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



51-SYE100-B



⚠ Caution

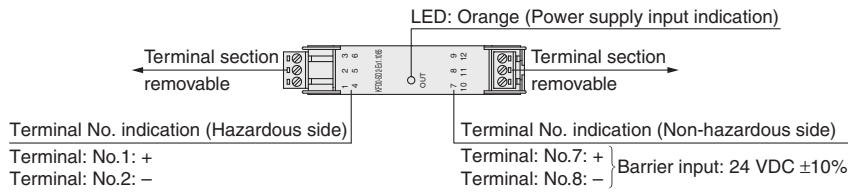
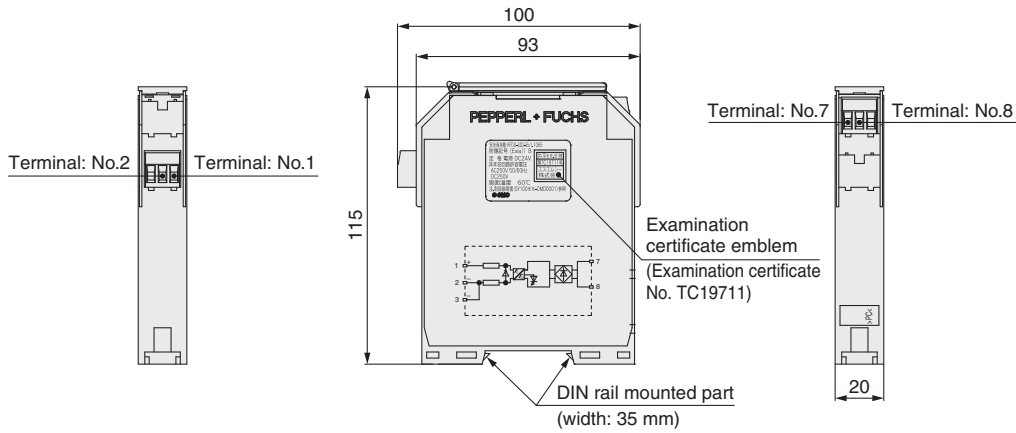
For this product, the barrier and the valve as a set are certified as a system, so please be aware of the following.

- For this product, both the barrier and the valve have an SMC model certification label with a model certification number listed on it. Be sure to use only a barrier and a valve whose numbers match.
- If an SMC model certification label has not been stuck on the product, or if the model certification numbers do not match, the product cannot be said to be an intrinsically safe explosion-proof system. Therefore, be sure to use only a barrier purchased from SMC.

Series 51-SY

Insulating Barrier Dimensions

51-SYE100-F



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

⚠ Caution

For this product, the barrier and the valve as a set are certified as a system, so please be aware of the following.

- For this product, both the barrier and the valve have an SMC model certification label with a model certification number listed on it. Be sure to use only a barrier and a valve whose numbers match.
- If an SMC model certification label has not been stuck on the product, or if the model certification numbers do not match, the product cannot be said to be an intrinsically safe explosion-proof system. Therefore, be sure to use only a barrier purchased from SMC.