KOGANEI CLEAN SYSTEM

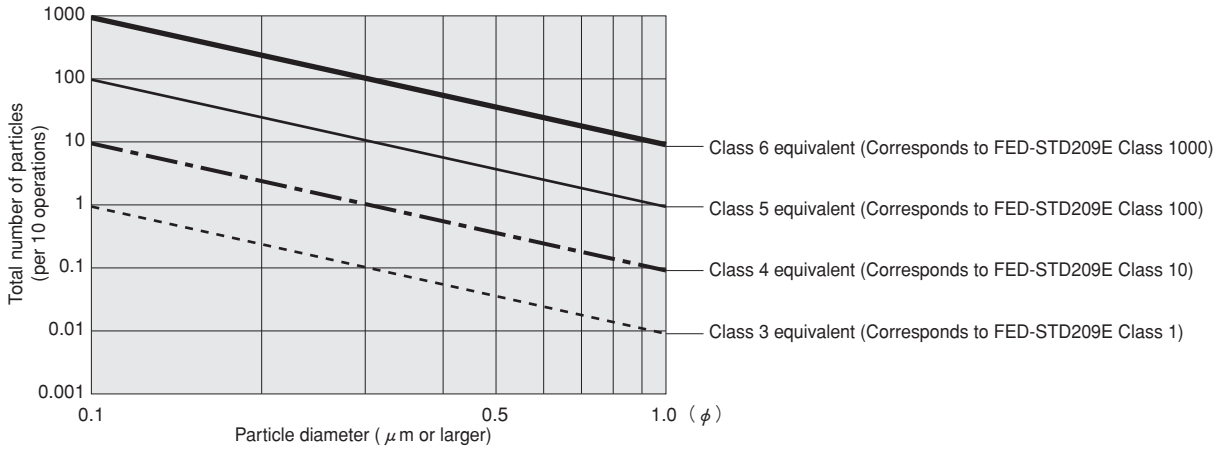
Koganei Clean System products provide complete support for the maintenance of a clean environment inside the cleanroom.

Koganei Clean System products meet the needs of the ultra-clean production environment. In everything from actuators and valves to air preparation and auxiliary equipment, anti-corrosion materials processing and other Koganei-developed design concepts serve to prevent particle contamination within the cleanroom. These perfectly designed mechanisms, which resolve even the slightest leaks to the outside during operations, have already won a high level of reliability.

Koganei Cleanliness

There is currently no standard in JIS or elsewhere for methods of evaluating cleanliness for pneumatic equipment in the cleanroom specifications. Therefore, to measure the effects of cleanroom contamination by pneumatic equipment, Koganei has decided to use "number of particles generated per 10 operations," rather than particle density. Koganei has also developed classifications for application classes in cleanroom, based on JIS and other upper limit density tables, and on the company's own experience.

Particle generation classification of Koganei pneumatic equipment



Remarks: 1. In the above table, product performance in terms of the number of particles generated per 10 operations is expressed as the upper limit of particles corresponding to the equivalent JIS or ISO class.
2. In the above table, values in the JIS, ISO, and FED-STD upper limit density tables are calculated as upper density per liter.
3. The classes shown are clean levels as classified in JIS and ISO.

From the above definitions, the Koganei clean level classes can be viewed as the level of average contamination per liter of surrounding air over a period of 10 operations in cleanroom. Air ventilation in cleanrooms is usually faster than 1 cycle per minute, and clean volumetric capacity is usually larger than 1 liter, which should provide a sufficient safety margin in practice.

Caution: The above conclusions are based on an ideal situation in which air ventilation is being implemented. For specific cases where air ventilation is not ensured, caution is needed since the clean classes cannot be maintained.

The clean system diagrams shown here are for Class 5 equivalent products. For Class 4 or Class 3 equivalent products, consult us.

Evaluations of Cleanliness

Koganei has therefore specified its in-house measurement methods, to conduct evaluations on the cleanroom rating.

The number of particles of the Air Cylinder Cleanroom Specification is measured as shown in the method below.

1. Measurement conditions

1-1 Test circuit: Figure 1 (no suction), Figure 2 (with suction)

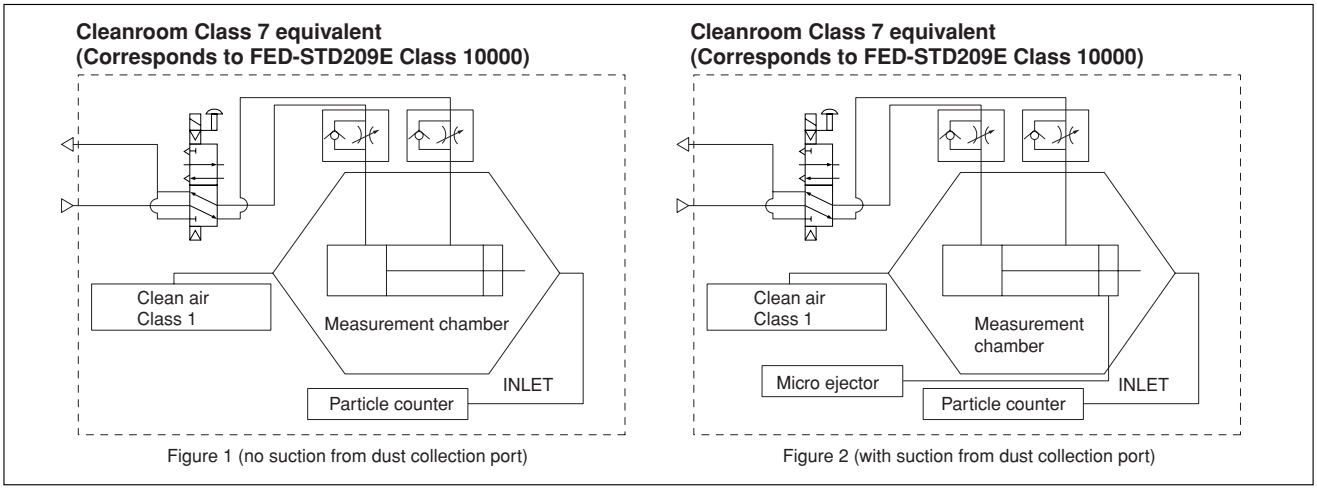


Figure 1 (no suction from dust collection port)

Figure 2 (with suction from dust collection port)

1-2 Operating conditions of tested cylinder
Operating frequency: 1Hz
Average speed: 500mm/s [20in./sec.]
Applied pressure: 0.5MPa [73psi.]
Suction condition: Microejector ME05, Primary side: 0.5MPa [73psi.] applied, Tube: ϕ6 [0.236in.]
Mounting direction: Vertical
Chamber volume: 8.3 ℓ [0.293ft^3]

2. Particle counter

Manufacturer/model: RION/KM20
Suction flow rate: 28.3 ℓ /min [1ft^3/min.]
Particle diameter: 0.1 μm, 0.2 μm, 0.3 μm, 0.5 μm, 0.7 μm, 1.0 μm

3. Measurement method

3-1 Confirmation of number of particles in the measurement system
Under the conditions in the above 1 and 2, using a particle counter to measure the sample for 9 minutes without operating the measurement sample, and confirmed the measured number of particle is 1 piece or less.

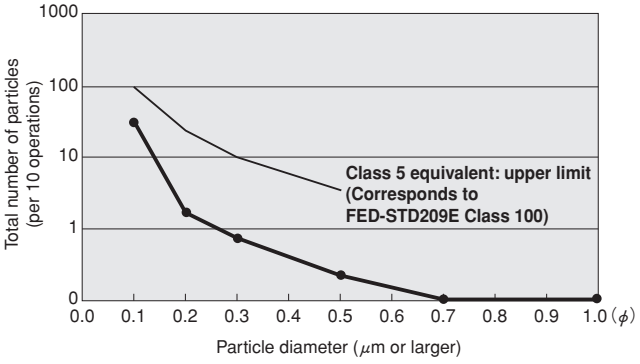
3-2 Measurement under operation
Under the conditions in the above1 and 2, operating the measurement sample for 36 minutes, and measured the total values in the latter half of 18 minutes test.

3-3 Reconfirmation
Performed the measurement in 3-1 again, to reconfirm the number of particles in the measurement system.

4. Measurement results

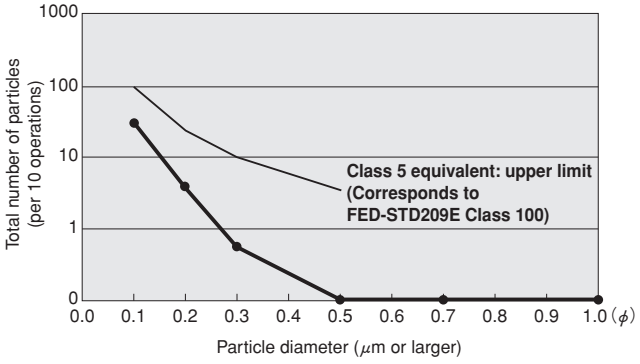
● **Cleanroom specification**
Jig Cylinder (no suction from dust collection port)

Particle generation over 1 million operations (CS-CDA16×30)



● **Cleanroom specification**
Slim Cylinder (with suction from dust collection port)

Particle generation over 1 million operations (CS-DA20×100)



Safety Precautions

Always read these precautions carefully before use.

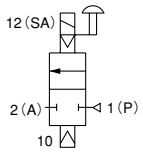
For “safety precautions” listed in the Clean System Product Drawings, see the materials below.

- For actuators, see “Safety Precautions” on p. 45 of the Actuators General Catalog .
- For valves, see “Safety Precautions” on p. 31 of the Valves General Catalog.
- For air treatment and auxiliary equipment, see “Safety Precautions” on p.31 of the General Catalog of Air Treatment, Auxiliary, Vacuum.

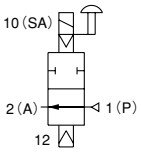
SOLENOID VALVES
EB SERIES

Symbols

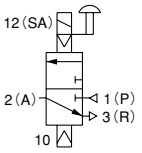
Single solenoid
2-port Normally closed (NC)



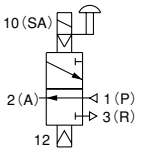
Single solenoid
2-port Normally open (NO)



Single solenoid
3-port Normally closed (NC)



Single solenoid
3-port Normally open (NO)



Specifications

Basic Models and Functions

Item \ Basic model		
	For direct piping, FE type manifold	**CS-EB10□F1** **CS-EB10□F2** **CS-EB10□F3** **CS-EB10□F4**
	For base piping, A, AJ type manifolds	**CS-EB10□A1** **CS-EB10□A2** **CS-EB10□A3** **CS-EB10□A4**
Number of positions		2 positions
Number of ports		2, 3 ports
Valve function		Single solenoid NC, NO

Remark: For the optional specifications and order codes, see p.167.

Port Size

Specification \ Port		2(A)	1(P)	3(R)	PR
Single unit	Direct piping	M3×0.5	M3×0.5	M3×0.5	——
	Base piping (with sub-base)	M5×0.8	M5×0.8	M5×0.8	M5×0.8
Manifold	FE type	M3×0.5	M5×0.8	Rc1/8	——
	A type	M5×0.8	Rc1/8	Rc1/8	Collected at 3(R) port
	AJ type	Quick fitting for ϕ4	Rc1/8	Rc1/8	

Specifications

Item \ Basic model		
	For direct piping, FE type manifold	**CS-EB10□F1** **CS-EB10□F2** **CS-EB10□F3** **CS-EB10□F4**
	For base piping, A, AJ type manifolds	**CS-EB10□A1** **CS-EB10□A2** **CS-EB10□A3** **CS-EB10□A4**
Media		Air
Operation type		Internal pilot type
Flow rate characteristics	Sonic conductance C dm³/(s・bar)	Base piping (A, AJ types): 0.26
	Effective area S〔Cv〕 mm²	Direct piping (FE type): 1.3〔0.07〕
Port size[Note 1]		M3×0.5
Lubrication		Not required
Operating pressure range	MPa [psi.]	0.2～0.7 [29～102]
Proof pressure	MPa [psi.]	1.05 [152]
Response time[Note 2] ON/OFF ms	Standard type	10/20 or below
	Low current type (L)	10/50 or below
	Quick response type (S)	6/7 or below
Maximum operating frequency Hz	Standard type	5
	Low current type (L)	2
	Quick response type (S)	10
Operating temperature range (atmosphere and media)	°C [°F]	5～50 [41～122]
Shock resistance	m/s² {G}	1373.0 {140} (Axial direction 294.2 {30})
Mounting direction		Any

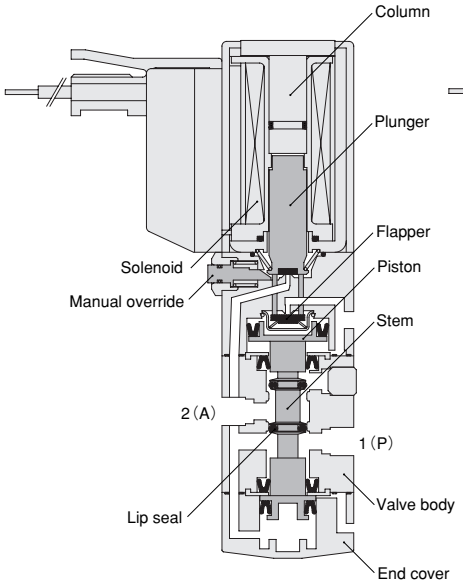
Notes: 1. For details, see the port size on p.164.
2. Values when air pressure is 0.5MPa [73psi.].

Solenoid Specifications

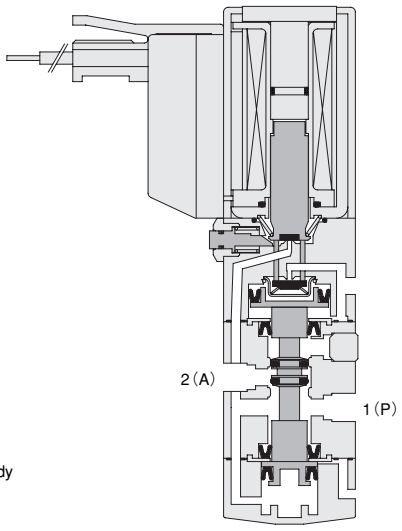
Item \ Rated voltage			DC12V (Standard type)	DC24V (Standard type)	DC24V (Low current type)	DC24V (Quick response type)
Operating voltage range		V	10.8～13.2 (12±10%)	21.6～26.4 (24±10%)	21.6～26.4 (24±10%)	21.6～26.4 (24±10%)
Standard type	Current (when rated voltage is applied)	mA (r.m.s)	46	23	—	—
	Power consumption	W	0.55	0.55	—	—
Low current type Quick response type	Current (when rated voltage is applied)	Starting mA	—	—	23	125
		Holding mA	—	—	6.3	46
	Power consumption	Starting W	—	—	0.55	3
		Holding W	—	—	0.15	1.1
	Start-up time (standard time)	ms	—	—	200 or below	30 or below
Allowable leakage current		mA	2	1	0.5	4
Insulation resistance		MΩ	Over 100 (value at DC500V megger)			
Color of LED indicator			Red			
Surge suppression (as standard)			Flywheel diode			

2-port

CS-EB10F1
De-energized



CS-EB10F2
De-energized

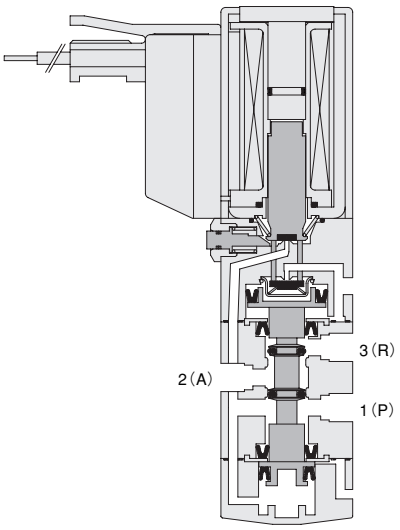


Major Parts and Materials

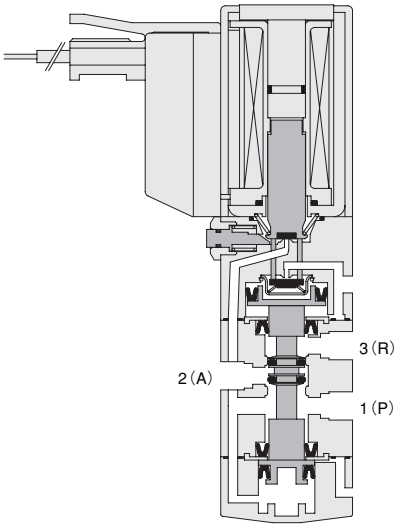
Parts		Materials
Valve	Body	Aluminum alloy (anodized)
	Stem	
	Lip seal	Synthetic rubber
	Flapper	
	Mounting base	Mild steel (zinc plated)
	Sub-base	Aluminum alloy (anodized)
	Plunger	Magnetic stainless steel
	Column	
	End cover	Plastic
Manifold	Body	Aluminum alloy (anodized)
	Block-off plate	Mild steel (nickel plated)
	Seal	Synthetic rubber

3-port

CS-EB10F3
De-energized



CS-EB10F4
De-energized



EB Series Single Valve Unit for Manifold/Sub-base Order Codes

■ Model

CS-EB10
Standard type

CS-EB10L
Low current type

CS-EB10S
Quick response type

■ Valve specification

F1, **A1**: 2-port normally closed (NC)

F2, **A2**: 2-port normally open (NO)

F3, **A3**: 3-port normally closed (NC)

F4, **A4**: 3-port normally open (NO)

■ Sub-base

Without sub-base

With sub-base

■ Manual override

Blank: Non-locking type

-83: Locking protruding type

■ Wiring specification

S type plug connector
Lead wire 300mm [11.8in.]

L type plug connector
Lead wire 300mm [11.8in.]

S type plug connector
Lead wire 1000mm [39in.]

L type plug connector
Lead wire 1000mm [39in.]

S type plug connector
Lead wire 3000mm [118in.]

L type plug connector
Lead wire 3000mm [118in.]

S type plug connector
Without connector ass'y

L type plug connector
Without connector ass'y

Grommet type[Note2]
Lead wire 300mm [11.8in.]
(moisture proof specification)

■ Voltage

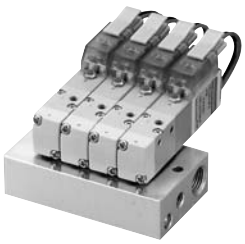
-D4
DC24V

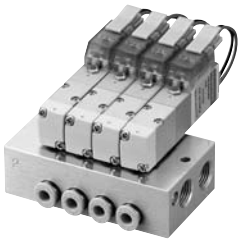
-D5
DC12V[Note3]

	Model	Valve specification	Sub-base	Manual override	Wiring specification	Voltage
Direct piping	**CS-EB10** **CS-EB10L** **CS-EB10S**	**F1** **F2** **F3** **F4**		**Blank** **-83**[Note1]	**-PS** **-PS1** **-PS3** **-PSN** **-PL** **-PL1** **-PL3** **-PLN** **-GL**[Note2]	**-D4** **-D5**[Note3]
Base piping	**CS-EB10** **CS-EB10L** **CS-EB10S**	**A1** **A2** **A3** **A4**	**Blank** **-25**	**Blank** **-83**[Note1]	**-PS** **-PS1** **-PS3** **-PSN** **-PL** **-PL1** **-PL3** **-PLN** **-GL**[Note2]	**-D4** **-D5**[Note3]

Notes: 1. The locking protruding type manual override is not available in the quick response type **CS-EB10S**.
2. The grommet type is not available in the low current type **CS-EB10L** and quick response type **CS-EB10S**.
3. The DC12V specification is not available in the low current type **CS-EB10L** and quick response type **CS-EB10S**.

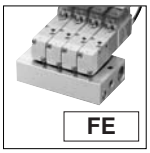
EB Series Manifold Order Codes



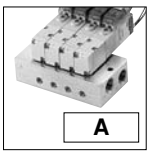


Manifold specification

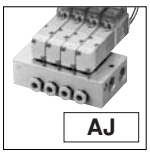
FE type (direct piping type)



A type (base piping type)



AJ type (with quick fittings)
(base piping type)



Model

CS-EB10
Standard type

CS-EB10L
Low current type

CS-EB10S
Quick response type

Valve specification

F1, **A1**: 2-port normally closed (NC)

F2, **A2**: 2-port normally open (NO)

F3, **A3**: 3-port normally closed (NC)

F4, **A4**: 3-port normally open (NO)

Manual override

Blank: Non-locking type

-83: Locking protruding type

Wiring specification

S type plug connector
Lead wire 300mm [11.8in.]

L type plug connector
Lead wire 300mm [11.8in.]

S type plug connector
Lead wire 1000mm [39in.]

L type plug connector
Lead wire 1000mm [39in.]

S type plug connector
Lead wire 3000mm [118in.]

L type plug connector
Lead wire 3000mm [118in.]

S type plug connector
Without connector ass'y

L type plug connector
Without connector ass'y

Grommet type[Note3]
Lead wire 300mm [11.8in.]
(moisture proof specification)

Voltage

-D4
DC24V

-D5
DC12V[Note4]

Model	Number of units	Manifold specification	Station	Model	Valve specification	Manual override	Wiring specification	Voltage
	Manifold model			Mounting valve model				
FE type manifold (direct piping type)	CS-EBM	2 . . . 20	FE	stn.1 . . . stn.□ Note1	CS-EB10 CS-EB10L CS-EB10S	F1 F2 F3 F4	Blank -83[Note2]	-PS -PS1 -PS3 -PSN -PL -PL1 -PL3 -PLN -GL[Note3]	-D4 -D5[Note4]
				CS-EBBP-F (for block-off plate)					
A , AJ type manifolds (base piping type)			A AJ	stn.1 . . . stn.□ Note1	CS-EB10 CS-EB10L CS-EB10S	A1 A2 A3 A4	Blank -83[Note2]	-PS -PS1 -PS3 -PSN -PL -PL1 -PL3 -PLN -GL[Note3]	-D4 -D5[Note4]
				CS-EBBP-A (for block-off plate)					

Notes: 1. The valve mounting location is from the left side of the manifold.
2. The locking protruding type manual override is not available in the quick response type **CS-EB10S**.
3. The grommet type is not available in the low current type **CS-EB10L** and quick response type **CS-EB10S**.
4. The DC12V specification is not available in the low current type **CS-EB10L** and quick response type **CS-EB10S**.

Block-off plate (block-off plate, gasket, and 2 mounting screws)

CS-EBBP - □

Specification
FE : For FE type manifold
A : For A, AJ type manifolds

Connector-related

EAZ - □

Connector specification
P : Connector, lead wire length 300mm [11.8in.]
P1 : Connector, lead wire length 1000mm [39in.]
P3 : Connector, lead wire length 3000mm [118in.]
PN : Connector, without lead wire (contacts included)

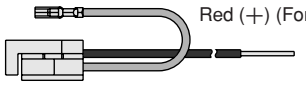
Common connector assembly

EAZ - □

Connector specification
PA : Positive common A type, connector, lead wire length 300mm [11.8in.]
PA1 : Positive common A type, connector, lead wire length 1000mm [39in.]
PA3 : Positive common A type, connector, lead wire length 3000mm [118in.]
PB : Positive common B type, connector, lead wire length 300mm [11.8in.]
PB1 : Positive common B type, connector, lead wire length 1000mm [39in.]
PB3 : Positive common B type, connector, lead wire length 3000mm [118in.]
PC : Positive common C type, connector, lead wire length 300mm [11.8in.]
PC1 : Positive common C type, connector, lead wire length 1000mm [39in.]
PC3 : Positive common C type, connector, lead wire length 3000mm [118in.]
CPN : Positive common, connector, without lead wire (short bar and contacts included)

A type: EAZ-PA□※

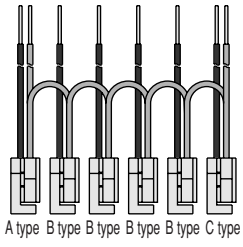
B type: EAZ-PB□※



C type: EAZ-PC□※

※Lead wire length **Blank** : 300mm [11.8in.]:
1 : 1000mm [39in.]
3 : 3000mm [118in.]

Application example



Dimensions of EB Series Solenoid Valve mm [in.]

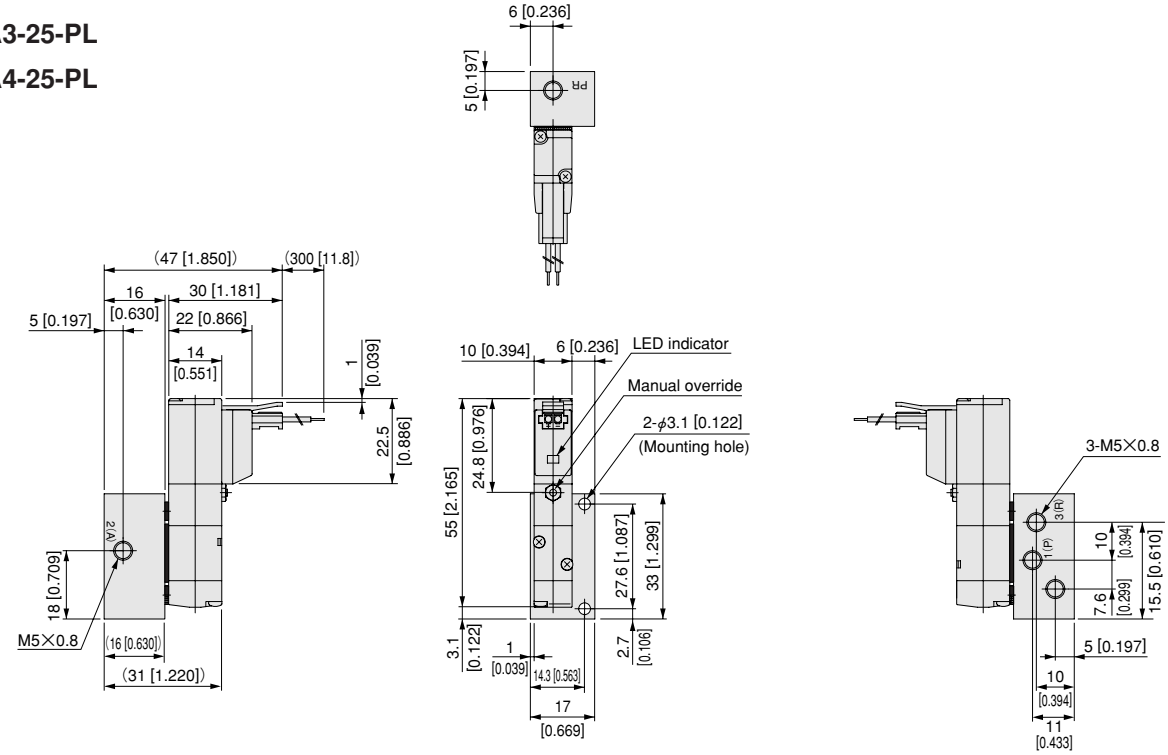
2, 3-port, single solenoid (with sub-base)

CS-EB10□A1-25-PL

CS-EB10□A2-25-PL

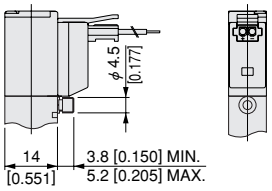
CS-EB10□A3-25-PL

CS-EB10□A4-25-PL

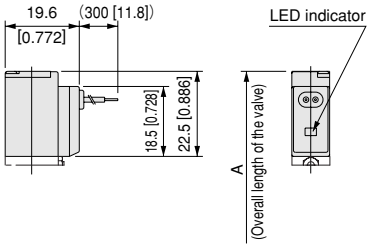


Options

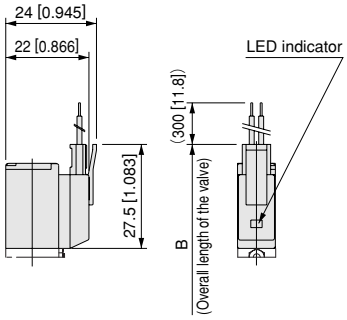
●Locking protruding type manual override: **-83**



●Grommet: **-GL**



●S type plug connector: **-PS**

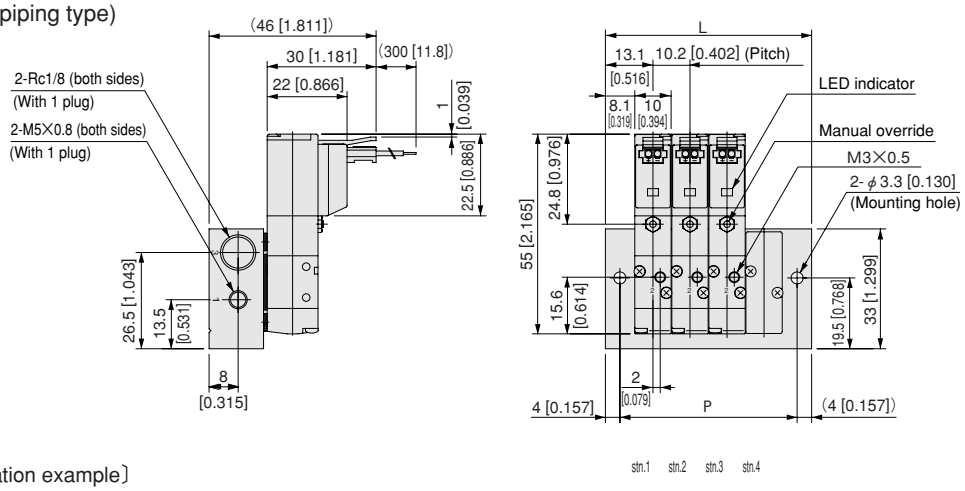


Model / Code	A	B	Remark
CS-EB10F1～CS-EB10F4,CS-EB10A1～CS-EB10A4	55 [2.165]	60 [2.362]	Overall length to the end of the valve
CS-EB10LF1～CS-EB10LF4,CS-EB10LA1～CS-EB10LA4	—	60 [2.362]	
CS-EB10SF1～CS-EB10SF4,CS-EB10SA1～CS-EB10SA4	—	60 [2.362]	

For 2, 3-port

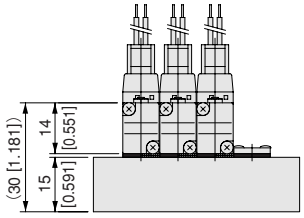
CS-EBM□FE

(Direct piping type)



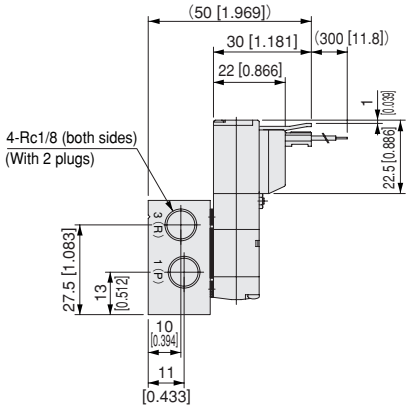
〔Installation example〕

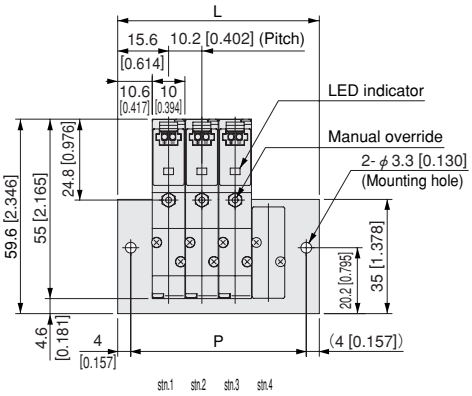
CS-EBM4FE
stn.1 CS-EB10F1-PL-D4
stn.2 CS-EB10F3-PL-D4
stn.3 CS-EB10F4-PL-D4
stn.4 CS-EBBP-F

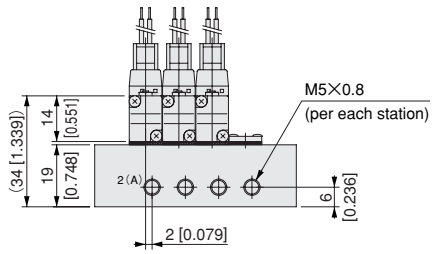


CS-EBM□A

(Base piping type)







〔Installation example〕

CS-EBM4A
stn.1 CS-EB10A1-PL-D4
stn.2 CS-EB10A3-PL-D4
stn.3 CS-EB10A4-PL-D4
stn.4 CS-EBBP-A

Unit dimensions

No. of units	L	P
2	36.4 [1.433]	28.4 [1.118]
3	46.6 [1.835]	38.6 [1.520]
4	56.8 [2.236]	48.8 [1.921]
5	67.0 [2.638]	59.0 [2.323]
6	77.2 [3.039]	69.2 [2.724]
7	87.4 [3.441]	79.4 [3.126]
8	97.6 [3.843]	89.6 [3.528]
9	107.8 [4.244]	99.8 [3.929]
10	118.0 [4.646]	110.0 [4.331]
11	128.2 [5.047]	120.2 [4.732]
12	138.4 [5.449]	130.4 [5.134]
13	148.6 [5.850]	140.6 [5.535]
14	158.8 [6.252]	150.8 [5.937]
15	169.0 [6.654]	161.0 [6.339]
16	179.2 [7.055]	171.2 [6.740]
17	189.4 [7.457]	181.4 [7.142]
18	199.6 [7.858]	191.6 [7.543]
19	209.8 [8.260]	201.8 [7.945]
20	220.0 [8.661]	212.0 [8.346]

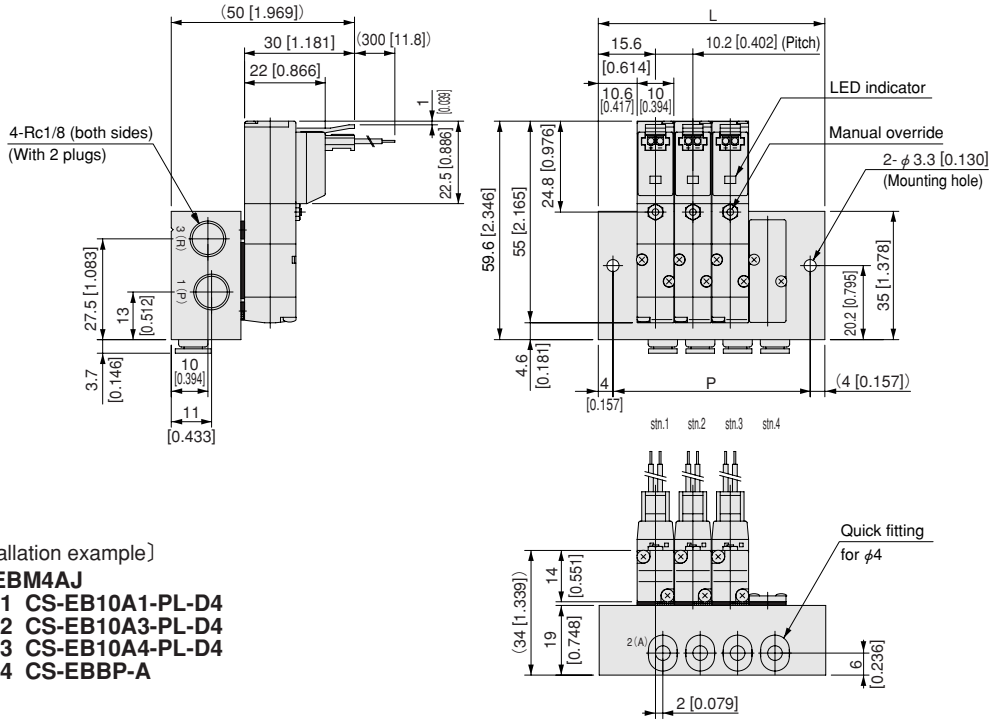
Unit dimensions

No. of units	L	P
2	41.4 [1.630]	33.4 [1.315]
3	51.6 [2.031]	43.6 [1.717]
4	61.8 [2.433]	53.8 [2.118]
5	72.0 [2.835]	64.0 [2.520]
6	82.2 [3.236]	74.2 [2.921]
7	92.4 [3.638]	84.4 [3.323]
8	102.6 [4.039]	94.6 [3.724]
9	112.8 [4.441]	104.8 [4.126]
10	123.0 [4.843]	115.0 [4.528]
11	133.2 [5.244]	125.2 [4.929]
12	143.4 [5.646]	135.4 [5.331]
13	153.6 [6.047]	145.6 [5.732]
14	163.8 [6.449]	155.8 [6.134]
15	174.0 [6.850]	166.0 [6.535]
16	184.2 [7.252]	176.2 [6.937]
17	194.4 [7.654]	186.4 [7.339]
18	204.6 [8.055]	196.6 [7.740]
19	214.8 [8.457]	206.8 [8.142]
20	225.0 [8.858]	217.0 [8.543]

For 2, 3-port

CS-EBM□AJ

(Base piping type with quick fittings)



〔Installation example〕

CS-EBM4AJ
stn.1 CS-EB10A1-PL-D4
stn.2 CS-EB10A3-PL-D4
stn.3 CS-EB10A4-PL-D4
stn.4 CS-EBBP-A

Unit dimensions

No. of units	L	P
2	41.4 [1.630]	33.4 [1.315]
3	51.6 [2.031]	43.6 [1.717]
4	61.8 [2.433]	53.8 [2.118]
5	72.0 [2.835]	64.0 [2.520]
6	82.2 [3.236]	74.2 [2.921]
7	92.4 [3.638]	84.4 [3.323]
8	102.6 [4.039]	94.6 [3.724]
9	112.8 [4.441]	104.8 [4.126]
10	123.0 [4.843]	115.0 [4.528]
11	133.2 [5.244]	125.2 [4.929]
12	143.4 [5.646]	135.4 [5.331]
13	153.6 [6.047]	145.6 [5.732]
14	163.8 [6.449]	155.8 [6.134]
15	174.0 [6.850]	166.0 [6.535]
16	184.2 [7.252]	176.2 [6.937]
17	194.4 [7.654]	186.4 [7.339]
18	204.6 [8.055]	196.6 [7.740]
19	214.8 [8.457]	206.8 [8.142]
20	225.0 [8.858]	217.0 [8.543]