

# 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.



- 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.**

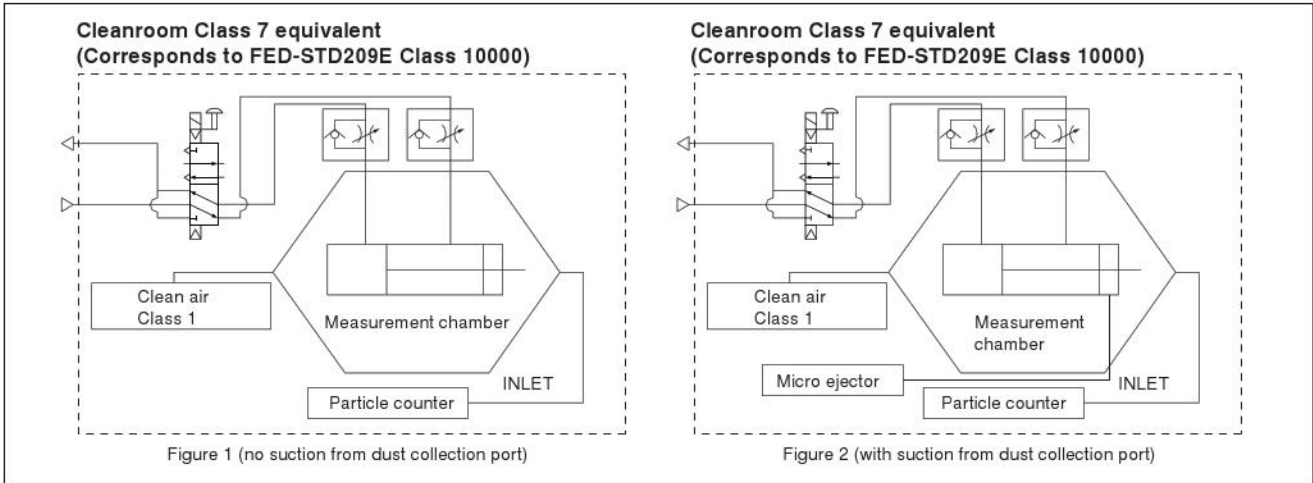
# Evaluations of Cleanliness

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)



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:  $\phi 6$  [0.236in.]
- Mounting direction: Vertical
- Chamber volume: 8.3  $\ell$  [0.293ft<sup>3</sup>]

## 2. Particle counter

- Manufacturer/model: RION/KM20
- Suction flow rate: 28.3  $\ell$  /min [1ft<sup>3</sup>/min.]
- Particle diameter: 0.1  $\mu\text{m}$ , 0.2  $\mu\text{m}$ , 0.3  $\mu\text{m}$ , 0.5  $\mu\text{m}$ , 0.7  $\mu\text{m}$ , 1.0  $\mu\text{m}$

## 3. Measurement method

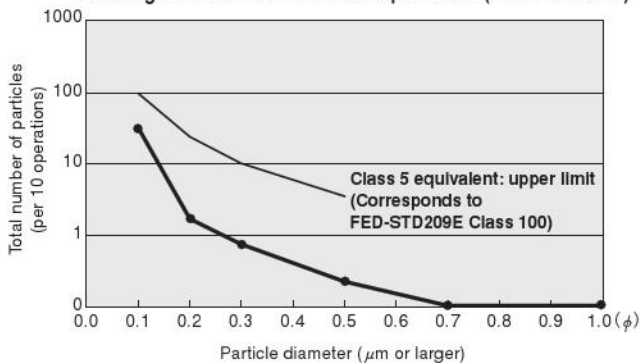
- 3-1 Confirmation of number of particles in the measurement system  
Under the conditions in the above 1 and 2, using a particle counter to measure the sample for 9 minutes without operating the measurement sample, and confirmed the measured number of particle is 1 piece or less.
- 3-2 Measurement under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

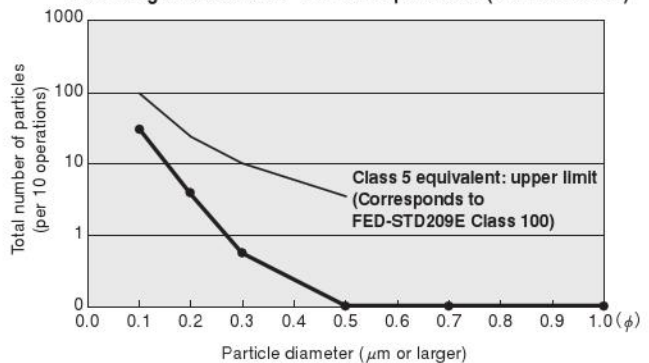
Particle generation over 1 million operations (CS-CDA16 $\times$ 30)



### ● Cleanroom specification

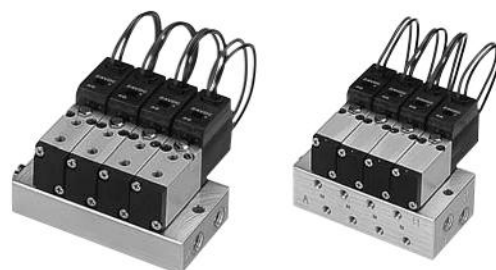
Slim Cylinder (with suction from dust collection port)

Particle generation over 1 million operations (CS-DA20 $\times$ 100)



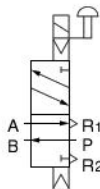
For "safety precautions" listed in the Clean System Product Drawings, see the materials below.

- 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.



## Symbol

5-port, 2-position  
Single solenoid



## Specifications

Item	Basic model	For direct piping, F type manifold	CS-010-4E1
		For A type manifold	CS-A010-4E1 <sup>Note2</sup>
Number of positions			2 positions
Number of ports			5 ports
Valve function			Single solenoid
Media			Air
Operation type			Internal pilot type
Effective area [Cv]	mm <sup>2</sup>		P→A 0.2 {0.01}    A→R1, B→R2 0.3 {0.02}
Port size			M3×0.5
Lubrication			Not required
Operating pressure range	MPa [psi.]		0.15~0.7 [22~102]
Proof pressure	MPa [psi.]		1.05 [152]
Response time <sup>Note 1</sup>	ms	DC5V, DC12V	4/8 or below
ON/OFF		DC6V, DC24V	4/8 or below
Maximum operating frequency	Hz		5
Minimum time to energize for self holding	ms		—
Operating temperature range (atmosphere and media)	°C [°F]		5~50 [41~122]
Shock resistance	m/s <sup>2</sup> {G}		1373.0 {140} (Axial direction 392.3 {40})
Mounting direction			Any

Notes: 1. Values when air pressure is 0.5MPa [73psi].

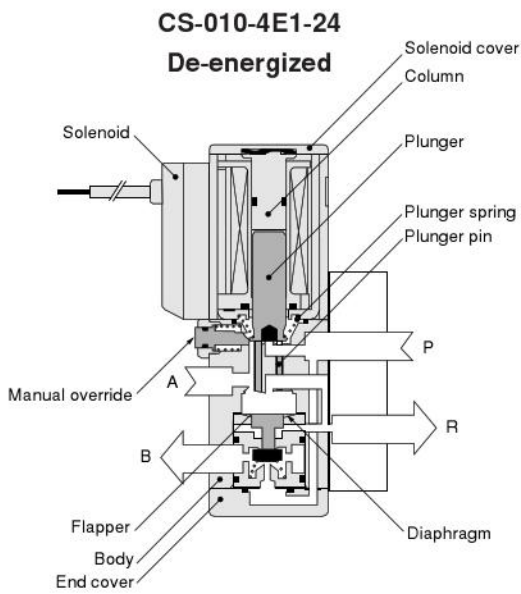
2. CS-A010-4E1 is for A type manifolds only. It cannot be used as a single unit.

## Solenoid Specifications

Item	Rated voltage	DC5V	DC6V	DC12V	DC24V
	Type		With built-in flywheel diodes for surge suppression		
Operating voltage range	DC V	4.5~5.5 (5±10%)	5.4~6.6 (6±10%)	10.8~13.2 (12±10%)	21.6~26.4 (24±10%)
Current (Power consumption when rated voltage is applied)	mA (W)	325 (1.6) (335 (1.7) with LED indicator)	270 (1.6) (280 (1.7) with LED indicator)	130 (1.6) (140 (1.7) with LED indicator)	70 (1.7) (80 (1.9) with LED indicator)
Maximum allowable leakage current	mA	30	25	15	5
Insulation resistance	MΩ	Over 100			
Wiring type	Standard	Grommet type			
	Optional	Plug connector type			
Lead wire length		300mm [11.8in.]			
Color of lead wire		Green (+) Black (-)	Blue (+) Black (-)	Brown (+) Black (-)	Red (+) Black (-)
Color of LED indicator		Red			
Surge suppression (as standard)		Flywheel diode			

## Inner Construction and Major Parts

### ● 5-port



### Major Parts and Materials

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

## Order Codes

<b>CS - 010E1</b>		-	-	-	-	-	<b>DC24V</b>			
<b>Clean system 010 series valve basic model</b>		Number of ports	Mounting base		Sub-base		Wiring type			Voltage
			3-port	Without mounting base	With mounting base	Without sub-base	With sub-base	Grommet	Straight connector	
<ul style="list-style-type: none"> <li>● For sub-base-mounted units (cannot be used for units without sub-base)</li> <li>● For A type manifold</li> </ul>		<b>CS-A010-4E1</b> 5-port	—	—	<b>Blank</b>	<b>- 25</b>	<b>Blank</b>	<b>- PSL</b>	<b>PLL</b>	<b>DC5V DC6V DC12V DC24V</b>
<ul style="list-style-type: none"> <li>● For direct piping</li> <li>● For F type manifold only</li> </ul>		<b>CS-010-4E1</b> 5-port	—	<b>Blank</b>	<b>- 21</b> <sup>Note</sup>	<b>- 24</b>				

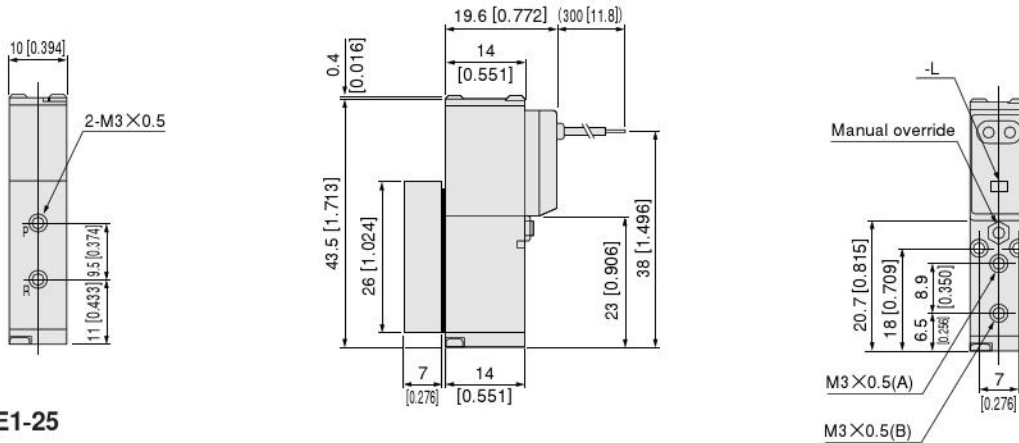
Note: With-mounting base (-21) specification can be used only with-sub-base specification (-24).

## Manifold Order Codes

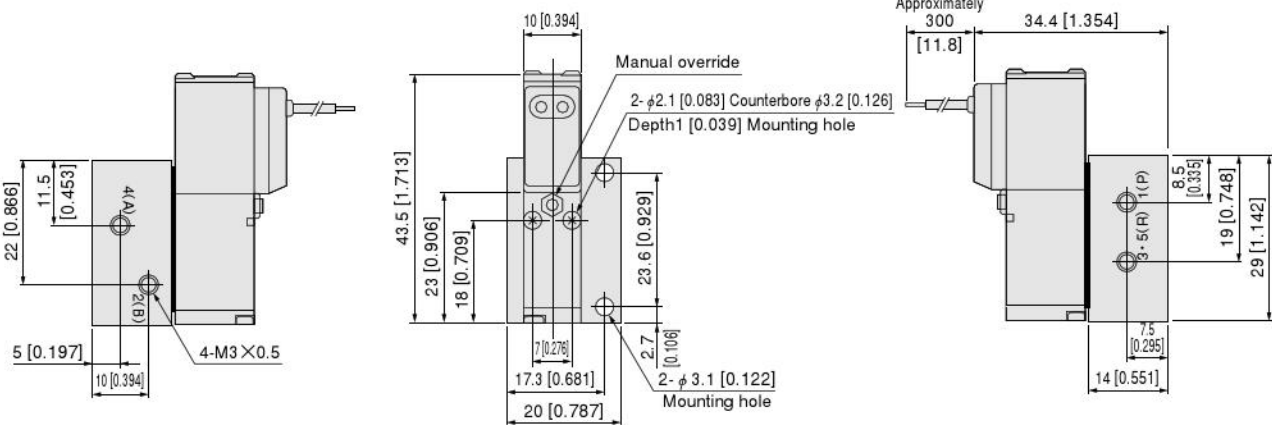
<b>CS - 010M</b>		-	-	-	-	-	-	-
<b>Clean system 010 series manifold basic model</b>		Number of units	Manifold model	Station		Clean system mounting valve model		
				<ul style="list-style-type: none"> <li>● For 2-, 3-port, F type manifold (PR common)—Dedicated for CS-010M</li> <li>● For 5-port, F type manifold (PR common)—Dedicated for CS-010MB</li> </ul>	<ul style="list-style-type: none"> <li>● Valve mounting position from left, as viewed from the front</li> </ul>	<ul style="list-style-type: none"> <li>● For details of valve models, see the order codes listed above.</li> <li>● Enter <b>CS-BP</b> when closing a station with a block-off plate without mounting a valve.</li> </ul>		
<ul style="list-style-type: none"> <li>● For 2-, 3-port, A type manifold (PR common, side A)—Dedicated for CS-010M</li> <li>● For 5-port, A type manifold (PR common, sides A, B)—Dedicated for CS010MB</li> </ul>		<ul style="list-style-type: none"> <li>2 : 2 units</li> <li>3 : 3 units</li> <li>⋮</li> <li>20 : 20 units</li> </ul>	<ul style="list-style-type: none"> <li><b>F</b>: F type</li> <li><b>A</b>: A type</li> </ul>	<ul style="list-style-type: none"> <li><b>Stn.1</b> : First</li> <li><b>Stn.2</b> : Second</li> <li><b>Stn.3</b> : Third</li> <li>⋮</li> <li><b>Stn.20</b> : 20th</li> </ul>				

# Dimensions of Solenoid Valve mm [in.]

## ● CS-010-4E1-24

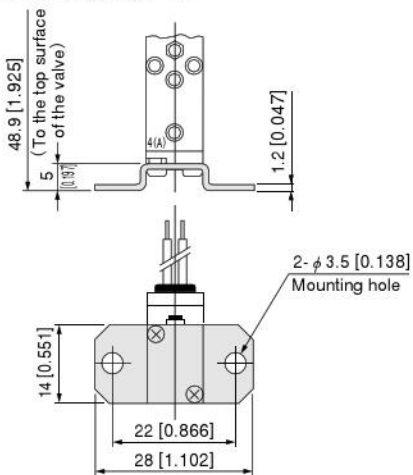


## ● CS-A010-4E1-25

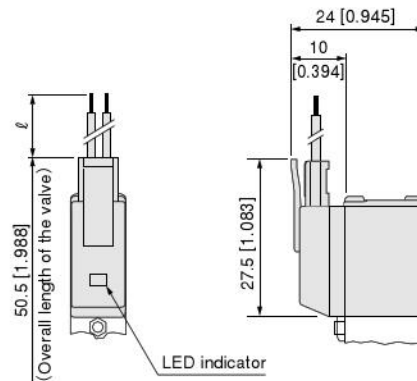


## ● Options

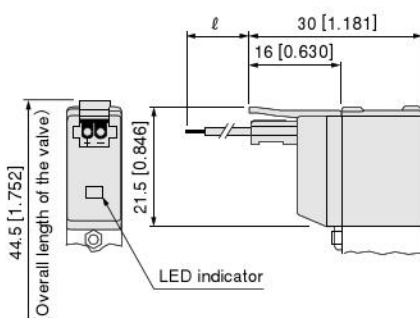
### ● Mounting base: -21



### ● Solenoid with straight connector: -PSL

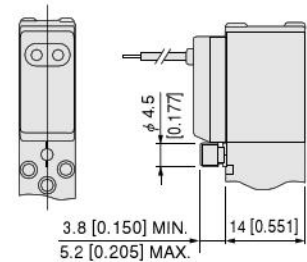


### ● Solenoid with L connector: -PLL

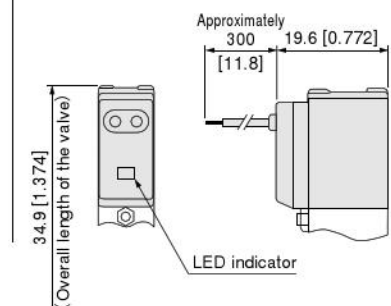


## ● Made to Order

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



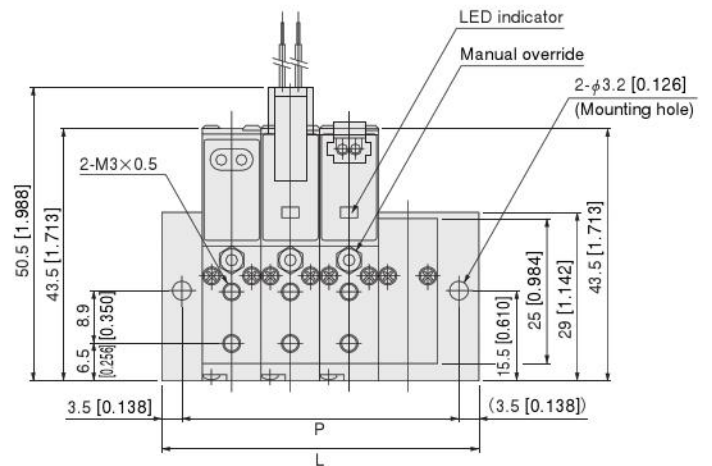
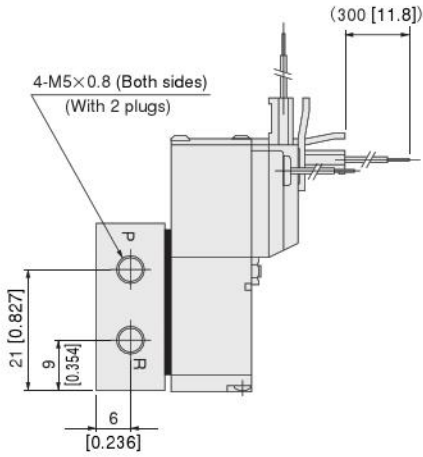
### ● Grommet type with LED indicator: -L



Model	Code	ℓ (Lead wire length)
-PSL, -PLL, -L (standard length)		300 [11.8]
Made to order	-1L	1000 [39]
	-3L	3000 [118]

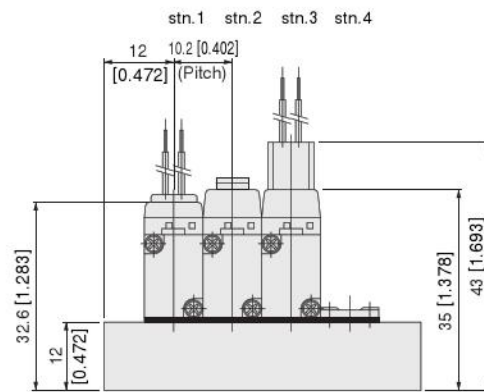
# Dimensions of Manifold for Combination Mounting of 2-, 3-, 5-port Valves mm [in.]

## ● CS-010MB□F



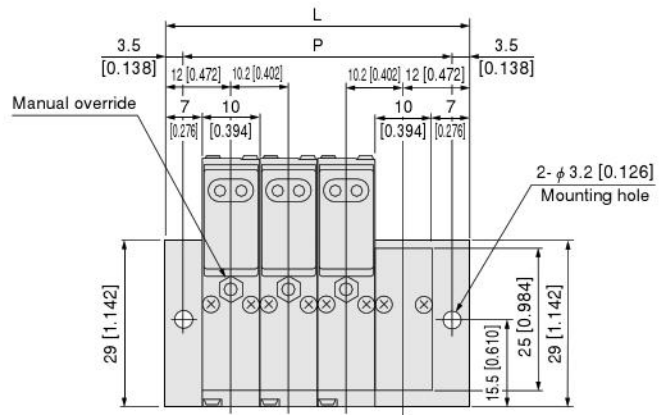
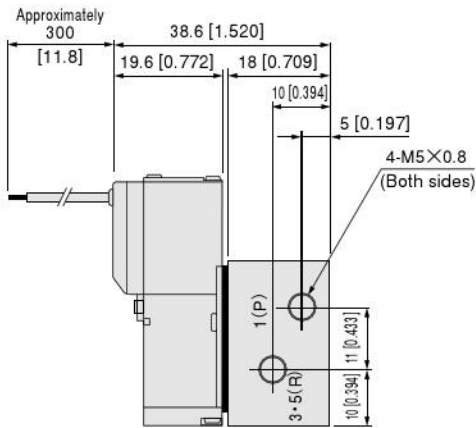
### Unit dimensions

Model	P	L
CS-010MB2F	27.2 [1.071]	34.2 [1.346]
CS-010MB3F	37.4 [1.472]	44.4 [1.748]
CS-010MB4F	47.6 [1.874]	54.6 [2.150]
CS-010MB5F	57.8 [2.276]	64.8 [2.551]
CS-010MB6F	68 [2.677]	75 [2.953]
CS-010MB7F	78.2 [3.079]	85.2 [3.354]
CS-010MB8F	88.4 [3.480]	95.4 [3.756]
CS-010MB9F	98.6 [3.882]	105.6 [4.157]
CS-010MB10F	108.8 [4.283]	115.8 [4.559]
CS-010MB11F	119 [4.685]	126 [4.961]
CS-010MB12F	129.2 [5.087]	136.2 [5.362]
CS-010MB13F	139.4 [5.488]	146.4 [5.764]
CS-010MB14F	149.6 [5.890]	156.6 [6.165]
CS-010MB15F	159.8 [6.291]	166.8 [6.567]
CS-010MB16F	170 [6.693]	177 [6.969]
CS-010MB17F	180.2 [7.094]	187.2 [7.370]
CS-010MB18F	190.4 [7.496]	197.4 [7.772]
CS-010MB19F	200.6 [7.898]	207.6 [8.173]
CS-010MB20F	210.8 [8.299]	217.8 [8.575]



# Dimensions of Manifold for Combination Mounting of 2-, 3-, 5-port Valves mm [in.]

## ● CS-010MB□A



### Unit dimensions

Model	P	L
CS-010MB2A	27.2 [1.071]	34.2 [1.346]
CS-010MB3A	37.4 [1.472]	44.4 [1.748]
CS-010MB4A	47.6 [1.874]	54.6 [2.150]
CS-010MB5A	57.8 [2.276]	64.8 [2.551]
CS-010MB6A	68 [2.677]	75 [2.953]
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CS-010MB17A	180.2 [7.094]	187.2 [7.370]
CS-010MB18A	190.4 [7.496]	197.4 [7.772]
CS-010MB19A	200.6 [7.898]	207.6 [8.173]
CS-010MB20A	210.8 [8.299]	217.8 [8.575]

