

KOGANEI

Air Valve

SOLENOID VALVES 100 SERIES

INSTRUCTION MANUAL Ver.1.0

Handling Instructions and Precautions

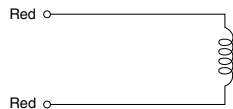


Solenoid

Internal circuit

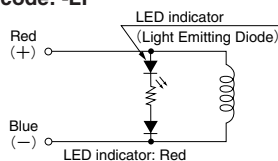
●DC24V

Standard solenoid



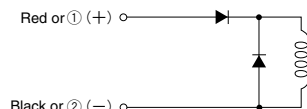
Solenoid with LED indicator

Order code: -LF



Solenoid (Surge suppression)

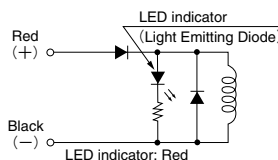
Order code: -SR



① and ② are for with DIN connector (order code: -39).

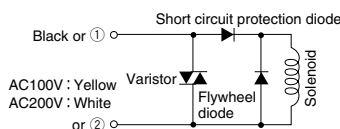
Solenoid with LED indicator (Surge suppression)

Order code: -LF-SR



●AC100V, AC200V (Surge suppression)

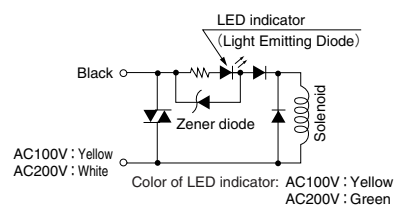
Standard solenoid



① and ② are for with DIN connector (order code: -39).

Solenoid with LED indicator

Order code: -LF



Cautions: 1. Do not apply megger between the lead wires.

2. The DC solenoid will not short circuit even if the wrong polarity is applied, but the valve will not operate.

3. Leakage current inside the circuit could result in failure of the solenoid valve to return, or in other erratic operation. Always use it within the range of the allowable leakage current. If circuit conditions, etc. cause the leakage current to exceed the maximum allowable leakage current, consult us.

4. For a double solenoid valve, avoid energizing both solenoids simultaneously. The valve could fall into the neutral position.

5. Since the AC solenoid uses diodes for the solenoid, always use lead wires of the same color when connecting a number of solenoid units in parallel. The DC24V standard solenoid, however, has no polarity, so either lead wire connection is acceptable.

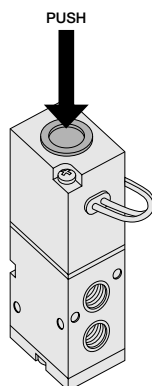


Manual override

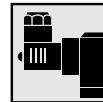
Non-locking type

To operate the manual override, press it all the way down. The single solenoid valve works the same as when in the energized state as long as the manual override is pushed down, and returns to the rest position upon release.

For the double solenoid valve, pressing the manual override on the 12(S1) side switches the 12(S1) to the energized state, and the unit remains in that state even after the manual override is released. To return it to the rest position, operate the manual override on the 14(S2) side. This is the same for the solenoid 14(S2).



※ Illustration shows the 200 series.

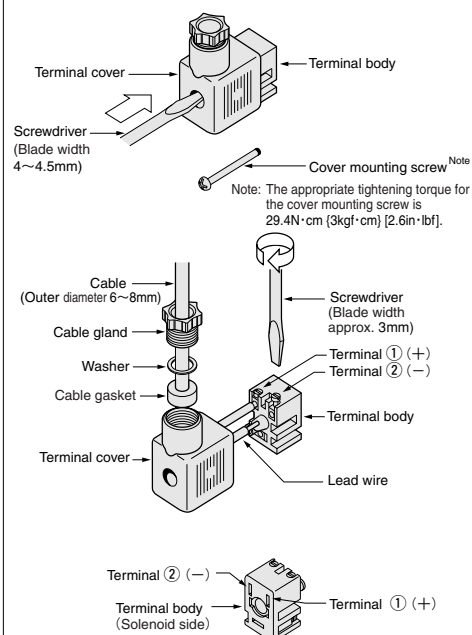


DIN connector

Wiring instructions

Remove the cover mounting screws, and lift the terminal cover off from the solenoid. Use a screwdriver (blade width 4~4.5mm [0.16~0.18in.]), etc. to push strongly against the terminal body through the hole of the terminal cover's mounting screw, and remove the terminal body.

Slip a cable gland, washer, and cable gasket over a cable (outer diameter 6~8mm [0.24~0.31in.]), insert the cable into the terminal cover's wiring port, and connect the lead wire to the terminal body (screwdriver blade width of about 3mm [0.12in.]).



※ For the DC24V solenoid with surge suppression, connect (+) to Terminal ①, and (-) to Terminal ②.

SOLENOID VALVES

100 SERIES

Basic Models and Functions

Item	Basic model	100E1 (M100E1 ^{Note})	100-4E1	100-4E2
	A type manifold	—	A100-4E1	A100-4E2
Number of positions		2 positions		
Number of ports		2, 3 ports	5 ports	
Valve function		Normally closed (NC) or Normally open (NO)	Single solenoid	Double solenoid

Remark: For optional specifications and order codes, see p.149~150.

Note: M100E1 is a dedicated valve for the manifold. For details, see “About M100E1” on p.149.

Specifications

Item	Basic model	100E1 (M100E1)	100-4E1	100-4E2
	A type manifold	—	A100-4E1	A100-4E2
Media		Air		
Operation type		Direct acting type		
Effective area [Cv]		5.0 [0.28]	3.4 [0.19]	3.0 [0.17]
Port size		Rc1/8		
Lubrication		Not required		
Operating pressure range MPa{kgf/cm ² } [psi.]		0~0.9 {0~9.2} [0~131]		0.2~0.7 {2~7.1} [29~102]
Proof pressure MPa{kgf/cm ² } [psi.]		1.35 {13.8} [196]		1.05 {10.7} [152]
Response time ^{Note} ms	DC24V	20/20 or below		20 or below
	AC100V, AC200V	20/20 or below		20 or below
Maximum operating frequency Hz		5		
Minimum time to energize for self holding ms		—		50
Operating temperature range (atmosphere and media) °C [°F]		0~50 [32~122]		5~50 [41~122]
Shock resistance m/s ² {G}	Lateral direction	1373.0 {140.0}		
	Axial direction	392.3 {40.0}		147.1 {15.0}
Mounting direction		Any		

Note: Values when air pressure is 0.5MPa {5.1 kgf/cm²} [73psi.]. Values of double solenoid valves are switching time from the opposite position.

Solenoid Specifications

Rated voltage		DC24V	AC100V		AC200V		
Item							
Type		DC type	Flywheel diode type				
Operating voltage range		V	21.6～26.4 (24±10%)	90～110 (100±10%)		180～220 (200±10%)	
Current ^{Note 1} (when rated voltage is applied)	Frequency	Hz	—	50	60	50	60
	Energizing ^{Note 2}	mA(r.m.s)	270 (6.5W) [282 (6.8W)]	100 [107]	95 [101]	48 [50]	46 [48]
Maximum allowable leakage current		mA	20	10		5	
Insulation resistance		MΩ	10				
Wiring type and lead wire length	Standard	Grommet type: 300mm [11.8in.]					
	Optional	With DIN connector					
Color of lead wire			Red 〔Red(+), Blue(—)〕 ^{Note 1} Red(+), Black(—) ^{Note 3}	Yellow, Black		White, Black	
Color of LED indicator (optional)			Red	Yellow		Green	
Surge suppression	Standard		—	Flywheel diode ^{Note 4}			
	Optional		Flywheel diode	—			

Notes: 1. Figures in brackets [] are for solenoids with LED indicators.

2. Since the AC types have built-in flywheel diodes, the starting current value and energizing current value are virtually the same.

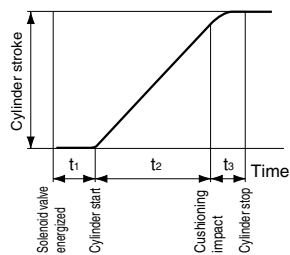
3. For solenoids with surge suppression, and solenoids with surge suppression and LED indicators.

4. Since the AC model has a built-in flywheel diode, they are sometimes not turned on by the solid-state relay (SSR) with zero-cross function.
For this reason, use it only after confirming the solid-state relay's ratings and precautions.

Manifold Port Size

Manifold model	Port	Location of piping port	Port size
HM□T	1 (P)	Manifold	Rc 1/8
	2 (A)	Valve	
	3 (R)	Manifold	
HM□F	1 (P)	Manifold	Rc 1/8
	4 (A), 2 (B)	Valve	
	3 (R2), 5 (R1)	Manifold	
HM□U	1 (P)	Manifold	Rc 1/8
	4 (A), 2 (B)	Valve	
	3 (R2), 5 (R1)	Valve	
HM□L	1 (P)	Manifold	Rc 1/8
	4 (A), 2 (B)	Valve	
	3 (R2), 5 (R1)	Valve	
HM□A	1 (P)	Manifold	Rc 1/8
	4 (A), 2 (B)		
	3 (R2), 5 (R1)		

Cylinder Operating Speed

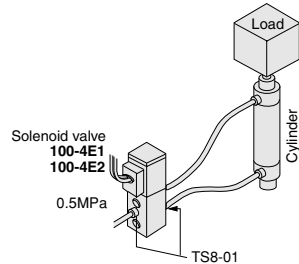


To obtain the time required for the cylinder to complete 1 stroke, add the cylinder's delay time t_1 (time between energizing of the solenoid valve and actual starting of the cylinder), to the cylinder's max. operating speed time t_2 . When a cushion is used, add the cushioning time t_3 , to the above calculations. The standard cushioning time t_3 is approximately 0.2 seconds.

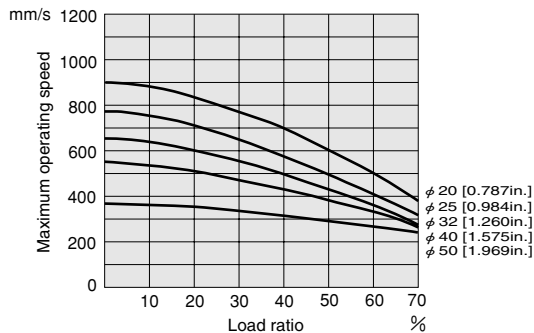
100-4E1, 100-4E2

Measurement conditions

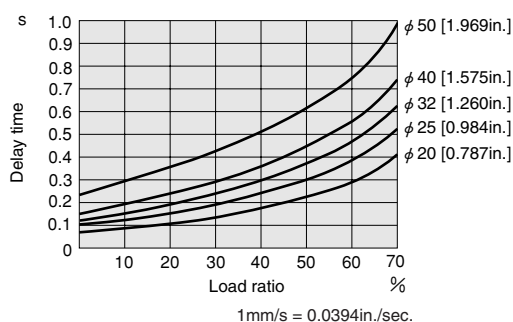
- Air pressure: 0.5MPa {5.1kgf/cm²} [73psi.]
- Piping inner diameter and length: $\phi 6 \times 600$ mm
- Fitting: Quick fitting TS8-01
- Load ratio = $\frac{\text{Load}}{\text{Cylinder theoretical thrust}}$ (%)
- Cylinder stroke: 150mm [5.91in.]



Maximum operating speed



Delay time



1mm/s = 0.0394in./sec.

Solenoid Valve Mass

g [oz.]

Basic model	Mass
100E1	190 [6.70]
M100E1	190 [6.70] ^{Note}
100-4E1	220 [7.76]
100-4E2	400 [14.11]
A100-4E1	230 [8.11]
A100-4E2	410 [14.46]

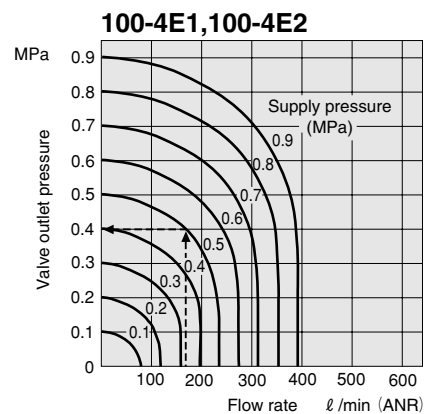
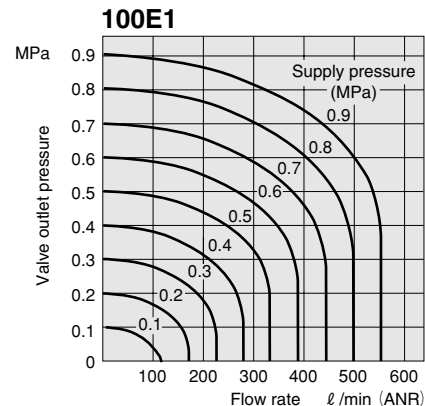
Note: Sub-plate not included. For sub-plate mass, see p.153.

Manifold Mass

g [oz.]

Manifold model	Mass calculation of each unit (n=number of units)	Block-off plate
HM□T	$(73 \times n) + 73$ [(2.57 × n) + 2.57]	21 [0.74]
HM□F	$(64 \times n) + 64$ [(2.26 × n) + 2.26]	26 [0.92]
HM□U	$(26 \times n) + 130$ [(0.92 × n) + 4.59]	11 [0.39]
HM□L	$(26 \times n) + 130$ [(0.92 × n) + 4.59]	11 [0.39]
HM□A	$(64 \times n) + 64$ [(2.26 × n) + 2.26]	26 [0.92]

Flow Rate



1MPa = 145 psi., 1 l/min = 0.0353ft³/min.

How to read the graph

When the supply pressure is 0.5MPa [73psi.] and flow rate is 175 l/min [6.18ft³/min.] (ANR), the valve outlet pressure becomes 0.4 MPa [58psi.].

100 Series Solenoid Valve Order Codes

2-, 3-port valve Number of ports	2-, 3-port valve Valve function	Mounting base	Wiring type ● Lead wire length: 300mm [11.8in.] is standard.	Speed controller	Muffler	LED indicator	Flywheel diode				
3-port 	Normally closed (NC) 	Without mounting base 	Grommet type 	Without speed controller 	Without muffler 	Without LED indicator 	Without flywheel diode 				
2-port 	Normally open (NO) <div>Note: When using as a normally open (NO) single unit, see the 2-, 3-port valves valve functions and connection port configurations on p.145.</div>	With mounting base 	DIN connector 	With speed controller 	With muffler 	With LED indicator 	With flywheel diode 				
		Basic model					Voltage				
Direct piping	2-, 3-port single solenoid	100E1	-2 ^{Note4}	-11 ^{Note2}	-21	-39	-70	-75	-LF	-SR	DC24V AC100V AC200V
	5-port single solenoid	100-4E1									
	5-port double solenoid	100-4E2									
For manifold only ^{Note1}	2-, 3-port single solenoid	M100E1	-2	-11			-75 ^{Note3}				DC24V AC100V AC200V
	5-port single solenoid	A100-4E1			-39			-LF	-SR		
	5-port double solenoid	A100-4E2									

Notes : 1. Cannot be used as a single unit.

2. For 2-port only. Always enter **100E1-2-11**. For the 3-port, supplying air through the 3(R) port and exhausting through the 1(P) port makes it possible to use as a normally open (NO) type valve.

3. For U, L type manifolds only.

4. A plug is included. Always install it in position before use.

● **M100E1** includes sub-plates for mounting on the F type manifold, gaskets, and mounting screws.

● When ordering the non-ion specification, enter **-NCU** after the basic model code.

● Not available with DIN connector.

● For DC24V only. For AC100V and AC200V, equipped as standard.

Manifold Models and the Applicable Valves Basic Models

Valve specification Manifold model	2-, 3-port	5-port	
	Single solenoid	Single solenoid	Double solenoid
HM□T	100E1 M100E1-11	—	
HM□F	M100E1 M100E1-11	100-4E1	100-4E2
HM□U	100E1	100-4E1	100-4E2
HM□L	M100E1-11		
HM□A	—	A100-4E1	A100-4E2

About M100E1

M100E1 is a dedicated valve for the manifold.

Differences with **100E1** are as shown in the table below:

Model	Point of difference	Remarks
M100E1	With sub-plate ^{Note}	For F type manifold only
M100E1-11	With sub-plate ^{Note} Port location	For T, F, U, L type manifolds

Note: The sub-plate is only used for mounting on F type manifolds. For details, see p.153.

100 Series Manifold Order Codes

2-, 3-port valve

Number of ports

3-port

Blank

2-, 3-port valve

Valve function

Normally closed (NC)

Blank

Wiring type

Lead wire length: 300mm [11.8in.] is standard.

Grommet type

Blank

Speed controller

Without speed controller

Blank

Muffler

Without muffler

Blank

LED indicator

Without LED indicator

Blank

Flywheel diode

Without flywheel diode

Blank

2-port

-2

Normally open (NO)

-11

DIN connector

-39

With speed controller

-70

With muffler

-75

With LED indicator

-LF

With flywheel diode

-SR

Basic model

Voltage

HM	2 ⋮ 10	T	stn. <input type="checkbox"/>	-100E1	-2	-11	-39		-LF	-SR	DC24V AC100V AC200V	
			stn. <input type="checkbox"/>	-M100E1Note								
		F	stn. <input type="checkbox"/>	-M100E1Note	-2	-11	-39		-LF	-SR	DC24V AC100V AC200V	
			stn. <input type="checkbox"/>	-100-4E1								
			-100-4E2									
		U L	stn. <input type="checkbox"/>	-100E1	-2	-11	-39	-70	-75	-LF	-SR	DC24V AC100V AC200V
			stn. <input type="checkbox"/>	-M100E1Note								
			stn. <input type="checkbox"/>	-100-4E1								
			-100-4E2									
		A	stn. <input type="checkbox"/>	-A100-4E1				-39		-LF	-SR	DC24V AC100V AC200V
			stn. <input type="checkbox"/>	-A100-4E2								

Note: **-M100E1** should be used in the normally open type (optional code: **-11**) only.

- Specify the valve model for each station.
- Enter **-BP** when closing a station with a block-off plate without mounting a valve.
- When ordering the non-ion specification, enter **-NCU** after the basic model code.
- Valve mounting location from the left-hand side when facing the 4(A), 2(B) ports.

- For DC24V only. For AC100V and AC200V, equipped as standard.
- Not available with DIN connector.

Options

Mounting base

-21

For direct piping
Not available with double solenoid

Speed controller

-70

For direct piping
Not available with 2-, 3-port

Muffler

-75

DIN connector

-39

Cannot be used with -LF

Built-in LED indicator

-LF

Built-in flywheel diode

-SR

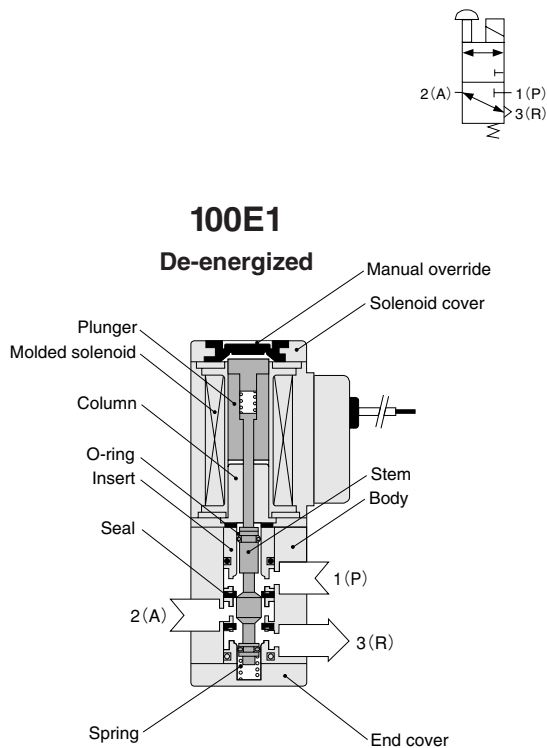
Only for DC24V

Block-off plate

-BP

Operating Principles and Symbols

3-port



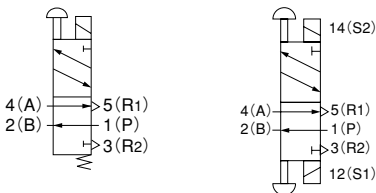
Major Parts and Materials

	Parts	Materials
Valve	Body	Aluminum alloy (anodized)
	Stem	Synthetic rubber
	Seal	Aluminum alloy and brass
	Insert	Stainless steel
	Spring	Mild steel (zinc plated)
	Mounting base	Magnetic stainless steel
	Column	Mild steel (zinc plated)
Manifold	Body	Aluminum alloy (anodized)
	Block-off plate	Synthetic rubber
	Seal	Aluminum alloy and brass
	Mounting bracket	Stainless steel

Remark: Materials that generate copper ions are not used for the non-ion specification.

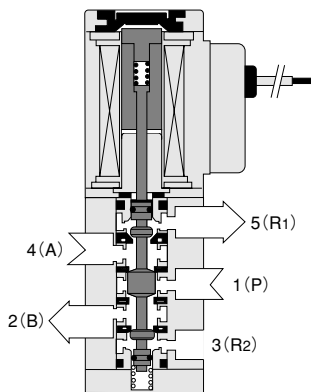
5-port

Single solenoid Double solenoid



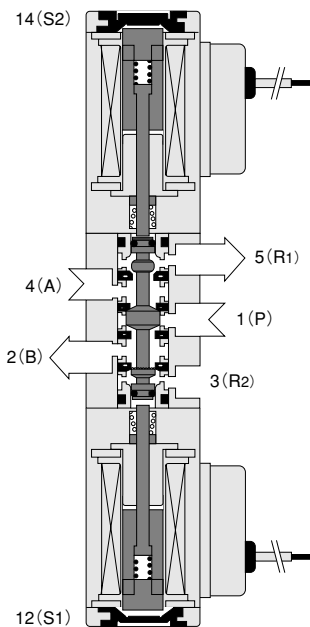
100-4E1

De-energized



100-4E2

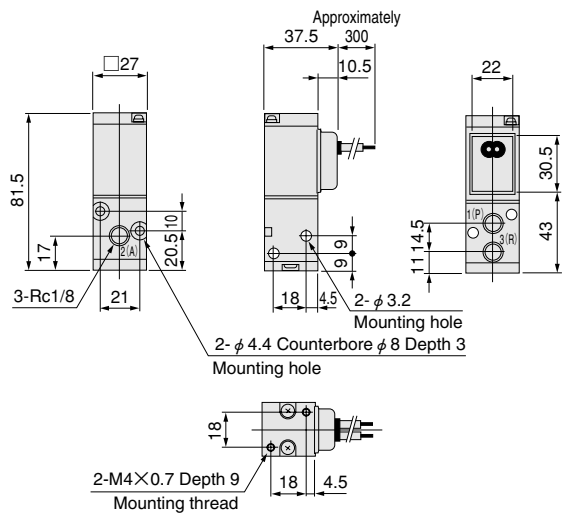
(De-energized condition after energizing solenoid 12(S1))



Dimensions of Solenoid Valve (mm)

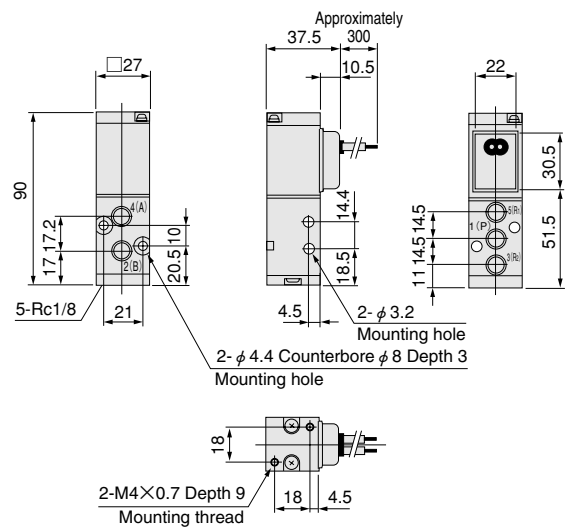
2-, 3-port

100E1

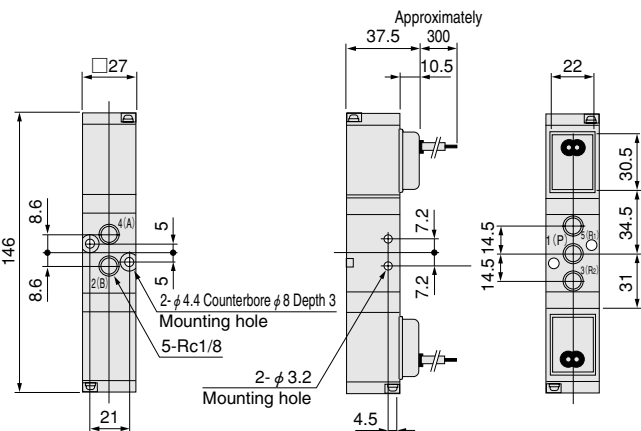


5-port

100-4E1

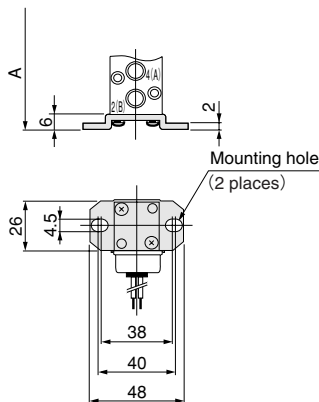


100-4E2

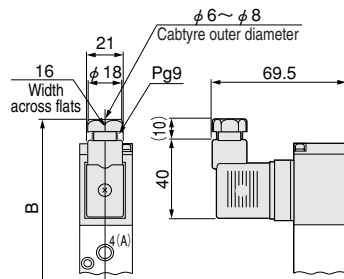


Options (mm)

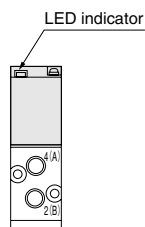
● Mounting base: -21



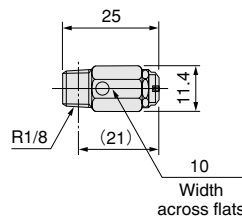
● Solenoid with DIN connector: -39



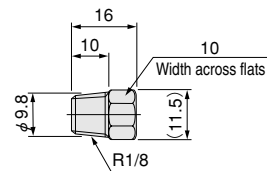
● Solenoid with LED indicator: -LF



● Speed controller: -70



● Muffler: -75

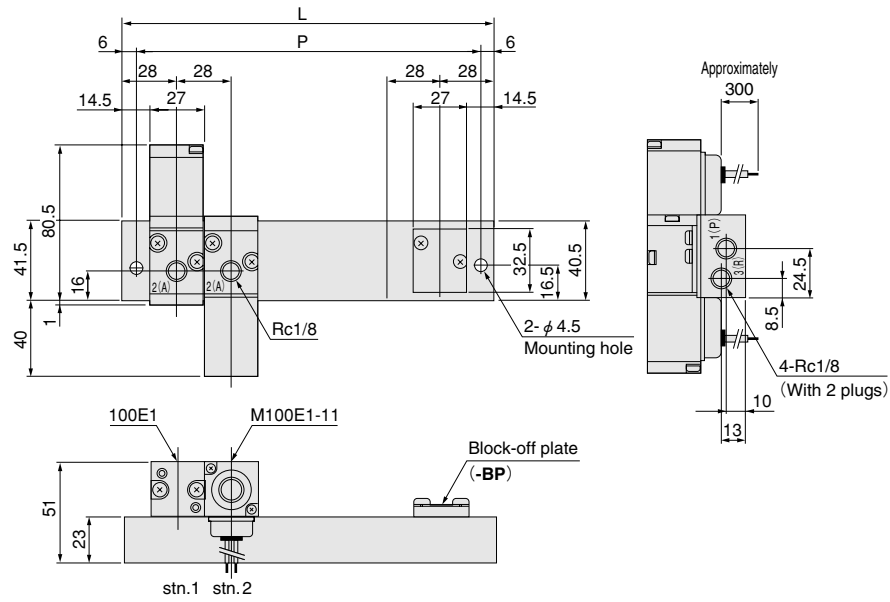


Model	Code	A	B	Remarks
100E1		87.5	94	A: Overall length to the top surface of the valve
100-4E1		96	103	B: Overall length to the bottom of the valve
100-4E2		—	172	Overall length to the end of the opposite side solenoid

Dimensions of Manifold (mm)

For 2-, 3-port

HM□T

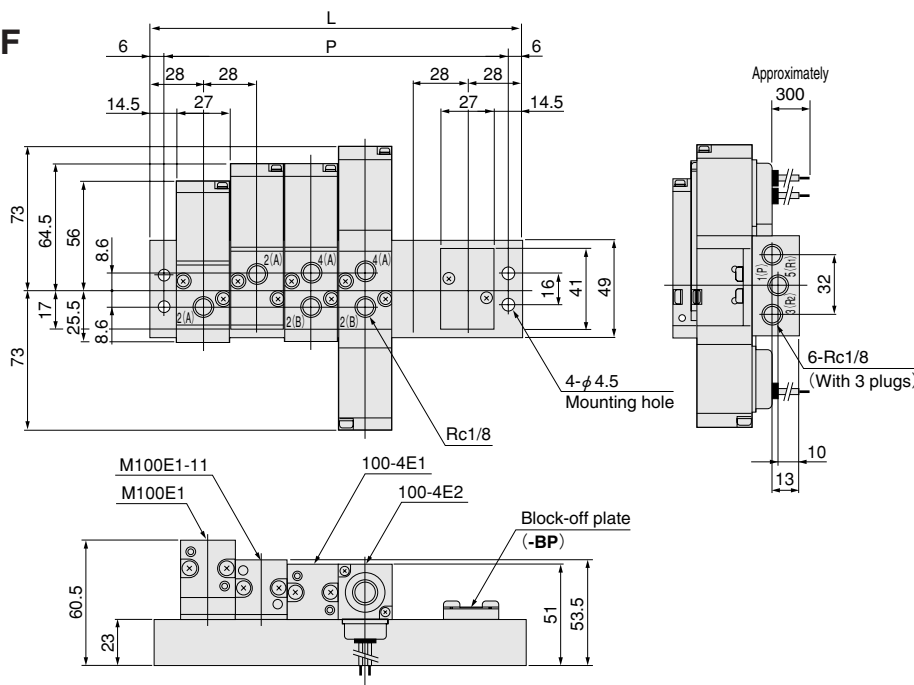


Unit dimensions

Model	L	P
HM2T	84	72
3T	112	100
4T	140	128
5T	168	156
6T	196	184
7T	224	212
8T	252	240
9T	280	268
10T	308	296

For combination mounting of 2-, 3-, 5-port

HM□F

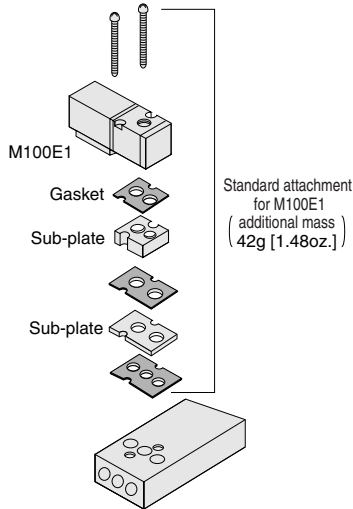


Unit dimensions

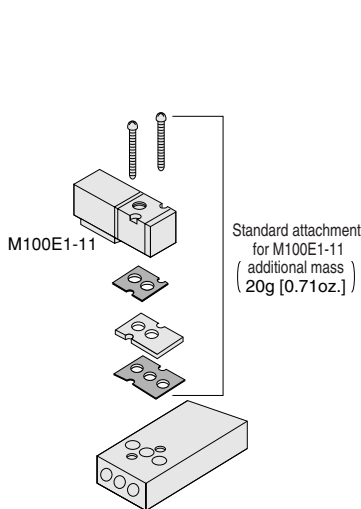
Model	L	P
HM2F	84	72
3F	112	100
4F	140	128
5F	168	156
6F	196	184
7F	224	212
8F	252	240
9F	280	268
10F	308	296

● Mounting 2-, 3-port valves on HM□F

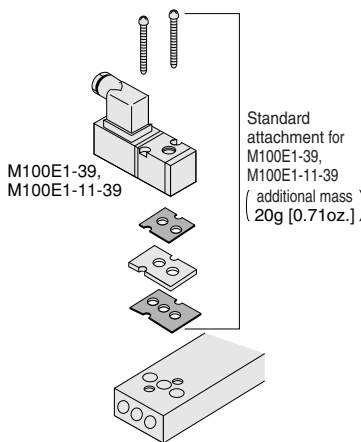
1. Mounting normally closed type



2. Mounting normally open type



3. Mounting normally closed or normally open with DIN connector



For options, see p.152.