

KOGANEI **VALVES GENERAL CATALOG**

SOLENOID VALVES

VALVEO GENERAL ONIALO	ч
SOLENOID VALVES 200 SERIES	
INDEX	S 200 SERIES
Features	66 67 70 71

The standard for square and direct acting types

Solenoid Valves 200 series

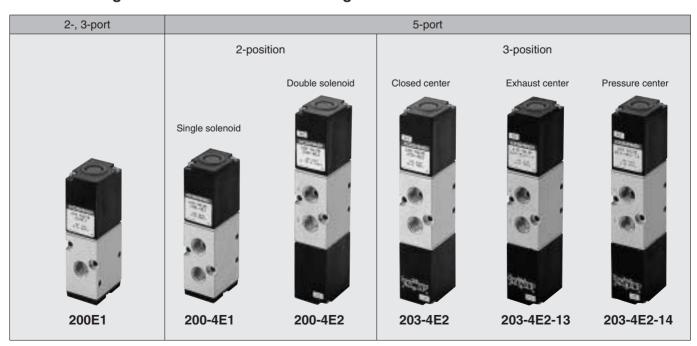
Offers reliable control of ϕ 32 [1.260in.] \sim ϕ 80 [3.150in.] bore size air cylinders. Standard direct acting solenoid valve offers a refined inner construction and versatility with excellent reliability and durability, responding with ease of use and flexibility to its "reliable operation" feature.

- The sealing method uses a pressure-balanced poppet for balancing supply pressure at the valve seat portion. Low power consumption translates to optimum performance for high cycle applications, and the valve is compact but large flow.
- An overspring mechanism prevents excessive force from being applied on the seal. It demonstrates excellent durability.
- The single solenoid 2-, 3-, 5-port valves offer assured operations even under low pressure. They demonstrate multiple performance capabilities as a low pressure specification actuator operation, selector valve, or divider valve.
- A flywheel diode is standard equipment for the AC solenoid (optional for the DC24V). Eliminates solenoid burning and humming.
- Responds to diversified needs. Wide selection of options.

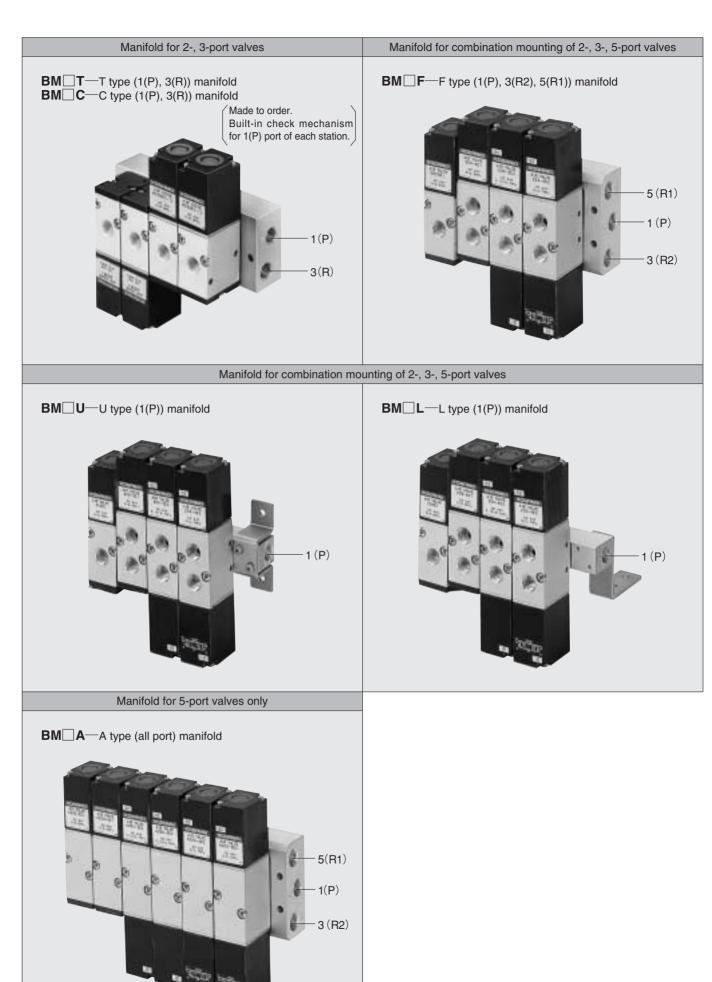
2-, 3-port Valves Valve Functions and Connection Port Configurations

		De-energized	Energized
2-port	Normally closed (NC)	2(A) 1(P) 3(R) (Plug)	2(A) 1(P) 3(R) (Plug)
2-p	Normally open (NO)	(Plug) 1(P) 3(R)	(Plug) 1(P) 3(R)
ort	Normally closed (NC)	2(A) 1(P) 3(R)	2(A) 1(P) 3(R)
g-E	Normally open (NO)	open 2(A)	2(A) 1(P) 3(R)
S	elector valve	2(A) 1(P) 3(R)	2(A) 1(P) 3(R)
ı	Divider valve	2(A) 1(P) 3(R)	2(A) 3(R)

200 Series Single Unit Basic Models and Configuration



200 Series Manifold Basic Models and Configuration



SOLENOID VALVES 200 SERIES

Basic Models and Functions

Basic model	Direct piping, T, C, F, U, L type manifolds	200E1 (M200E1 ^{Note})	200-4E1	200-4E2	203-4E2
Item	A type manifold	—	A200-4E1	A200-4E2	A203-4E2
Number of positions		2 positions 3 position		3 positions	
Number of ports	Number of ports		5 ports		
Valve function		Normally closed (NC) or Normally open (NO)	Single solenoid	Double solenoid	Closed center (standard), exhaust center or pressure center (option)

Remark: For optional specifications and order codes, see p.163~164.

Note: M200E1 is a dedicated valve for the manifold. For details, see "About M200E1" on p.163.

Specifications

Basic model	Direct piping, T, C, F, U, L type manifolds	200E1 (M200E1)	200-4E1	200-4E2	203-4E2
Item	A type manifold		A200-4E1	A200-4E2	A203-4E2
Media			A	ir	
Operation type			Direct ac	ting type	
Effective area (Cv)	mm ²	8.5(0.47)	7.5(0).42)	6.5 (0.36)
Port size		Rc1/4			
Lubrication		Not required			
Operating pressure range MPa{kgf/cm²} [psi.]		$0 \sim 0.9 \{0 \sim 9.2\} [0 \sim 131]$ $0.15 \sim 0.7 \{1.5 \sim 7.1\} [22 \sim 102]$		0~0.7 {0~7.1} [0~102]	
Proof pressure	MPa{kgf/cm²} [psi.]	1.35 {13.8} [196] 1.05 {10.7		.7} [152]	
Response time Note ms	DC24V	20/20 c	or below	20 or below	20/20 or below
ON/OFF	AC100V, AC200V	20/20 c	or below	20 or below	20/20 or below
Maximum operating fre	equency Hz	5			
Minimum time to energize for self holding ms		— 50		_	
Operating temperature range (atmosphere and media) °C [°F]		0~50 [32~122]			
Ch l i-t (-2 (O)	Lateral direction	980.7 {100.0}			
Shock resistance m/s ² {G}	Axial direction	588.4 {60.0}	392.3 {40.0}	294.2 {30.0}	588.4 {60.0}
Mounting direction			Aı	ny	

Note: Values when air pressure is 0.5MPa {5.1 kgf/cm²} [73psi.]. Values for \square 200-4E2 are switching time from the opposite-side position, and for \square 203-4E2 are switching time from the neutral valve position.

Solenoid Specifications

Rated voltage		DC24V	AC1	100V	AC2	200V
Туре		DC type		Flywheel	diode type	
Operating voltage ran	ge V	21.6~26.4 (24 + 10%)	90 ~ (100 ±	-110 :10%)	180~220 (200 ±10%)	
Current ^{Note 1}	Frequency Hz	_	50	60	50	60
(when rated voltage is applied)	EnergizingNote 2 mA(r.m.s)	420 (10.1W) [432 (10.4W)]	160 (170)	150 (160)	70 (72)	65 (68)
Maximum allowable leakage current mA		30	15 7		7	
Insulation resistance MΩ			10			
Wiring type and	Standard	Grommet type: 300mm [11.8in.]				
lead wire length	Optional	With DIN connector				
Color of lead wire $ \begin{array}{c} \operatorname{Red} \\ \left(\operatorname{Red} (+), \operatorname{Blue} (-)\right)^{\operatorname{Note} 1} \\ \operatorname{Red} (+), \operatorname{Black} (-)^{\operatorname{Note} 3} \end{array} $		Yellow	, Black	White,	, Black	
Color of LED indicator (optional)		Red	Yellow Green		een	
Curae cuppression	Standard		Flywheel diode ^{Note 4}			
Surge suppression	Optional	Flywheel diode	_			

- Notes: 1. Figures and descriptions 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 types have built-in flywheel diodes, 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		
	1(P)	Manifold			
BM⊡T BM⊡C	2(A)	Valve	Rc 1/4		
	3(R)	Manifold			
	1(P)	Manifold			
BM□F	4(A), 2(B)	Valve	Rc 1/4		
	3(R2), 5(R1)	Manifold			
	1(P)	Manifold			
BM□U	4(A), 2(B)	Valve	Rc 1/4		
	3(R2), 5(R1)	Valve			
	1(P)	Manifold			
BM□L	4(A), 2(B)	Valve	Rc 1/4		
	3(R2), 5(R1)	Valve			
	1(P)				
BM□A	4(A), 2(B)	Manifold	Rc 1/4		
	3(R2), 5(R1)				

Solenoid Valve Mass

g [oz.]

Basic model	Mass	
200E1	300 [10.58]	
M200E1	300 [10.58] Note	
200-4E1	330 [11.64]	
200-4E2	520 [18.34]	
203-4E2	500 [17.64]	
A200-4E1	330 [11.64]	
A200-4E2	520 [18.34]	
A203-4E2	525 [18.52]	

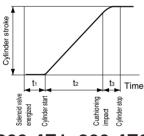
Note: Sub-plate not included. For sub-plate mass, see p.167.

Manifold Mass

g [oz.]

		31- 1
Manifold model	Mass calculation of each unit (n=number of units)	Block-off plate
ВМ□Т	$(138\times n)+125$ $[(4.87\times n)+4.41]$	30 [1.06]
ВМ□С	$(138\times n)+125$ $[(4.87\times n)+4.41]$	30 [1.06]
BM□F	$(163\times n)+175$ $[(5.75\times n)+6.17]$	42 [1.48]
BM□U	$(50\times n)+200$ [$(1.76\times n)+7.05$]	15 [0.53]
BM□L	$(50\times n)+200$ [$(1.76\times n)+7.05$]	15 [0.53]
BM□A	$(145\times n)+150$ $[(5.11\times n)+5.29]$	42 [1.48]

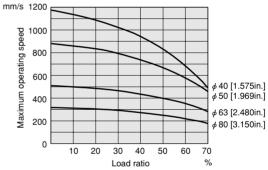
Cylinder Operating Speed



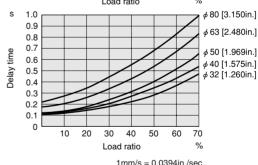
To obtain the time required for the cylinder to complete 1 stroke, add the cylinder's delay time t₁ (time between energizing of the solenoid valve and actual starting of the cylinder), to the cylinder's max. operating speed time t₂.

When a cushion is used, add the cushioning time t₃, to the above calculations. The standard cushioning time t₃ is approximately 0.2 seconds.

Maximum operating speed



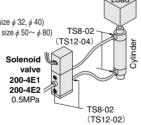
Delay time



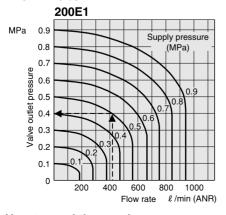
200-4E1, 200-4E2

Measurement conditions

- Air pressure: 0.5MPa {5.1kgf/cm²} [73psi.]
- lacktriangle Piping inner diameter and length: ϕ 6×600mm (Bore size ϕ 32, ϕ 40) ϕ 8×1000mm (Bore size ϕ 50~ ϕ 80)
- Fitting: Quick fitting TS8-02(TS12-02, TS12-04)
- Load ratio = Load Cylinder theoretical thrust (%)
- Ocylinder stroke: 300mm [11.8in.]

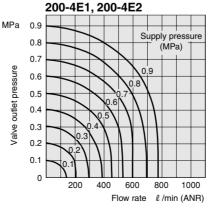


Flow Rate

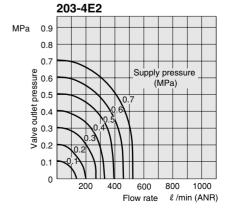


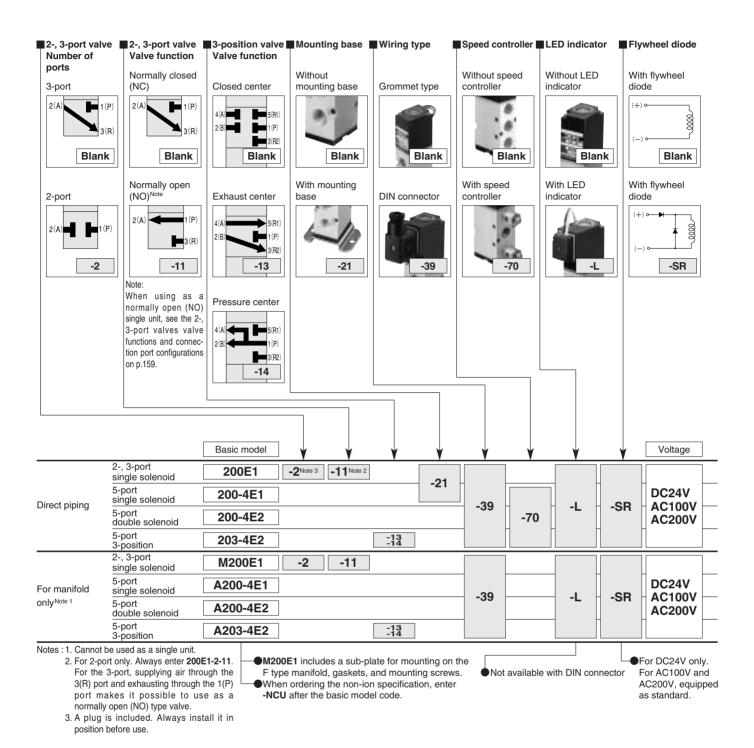
How to read the graph

When the supply pressure is 0.5MPa [73psi.] and flow rate is 415 ℓ /min [14.6ft β /min.] (ANR), the valve outlet pressure becomes 0.4 MPa [58psi.].



1MPa = 145psi., 1 ℓ /min = 0.0353ft. 3 /min.





Manifold Models and Applicable Valves Basic Models

••				
Valve specification	2-, 3-port	5-port		
Manifold model	Single solenoid	Single solenoid Double solenoid 3-position		
вм□т	200E1			
BM CNote	M200E1-11			
BM□F	M200E1 M200E1-11	200-4E1	200-4E2	203-4E2
BM□U	200E1	200-4E1	200-4E2	203-4E2
BM□L	M200E1-11	200-4E1	200-4EZ	200-4EZ
BM□A		A200-4E1	A200-4E2	A203-4E2

Note: **BM**□**C** is made to order.

●About M200E1

M200E1 is a dedicated valve for the manifold. Differences with **200E1** are as shown in the table below.

Model	Point of difference	Remarks
M200E1	With sub-plate ^{Note}	For F type manifold only
M200E1-11	With sub-plate Note Port location	For T, C, F, U, L type manifolds

Note: The sub-plate is only used for mounting on F type manifolds. For details, see p.167.

200 Series Manifold Order Codes 2-, 3-port valve 2-, 3-port valve 3-position valve ■ Wiring type ■ Speed controller ■ LED indicator Flywheel diode Sub-base regulator Number of Valve function Valve function ports Without sub-base Normally closed Without speed Without LED Without flywheel Grommet type regulator 3-port (NC) Closed center controller indicator diode 2(4 1(P) 2(4 1(P) (+) 5(R1) 1 (P) 2(B 3(R) 3(R2 Blank Blank Blank Blank Blank Blank Blank With sub-base Normally open With speed With flywheel regulator 2-port (NO) Exhaust center DIN connector controller LED indicator diode (+) o 2(A) 9000 1(P) 3(R) 3(R2) -2 -11 -13 -70 -SR Pressure center 3(R2 -14 Manifold model Number of units Station Basic model Voltage -200E1 DC24V stņ.□ T -39 -L -SR AC100V -2 C -11 -M200E1 Note stn.□ **AC200V** -M200E1 Note -2 -11 DC24V stn.□ -200-4E1 F : -39 -L -SR **AC100V** -200-4E2 stn.□ **AC200V** -13 -14 -203-4E2 2 -200E1 BM -2 -M200E1Note -11 10 DC24V stn.□ U -200-4E1 -39 -SR **AC100V** L stn.□ **AC200V** -200-4E2 -70 -203-4E2 -A200-4E1 DC24V stn.□ -52

Note: -M200E1 should be used in the normally open (optional code: -11) type only.

stn.□

Options

2(B) ports.

●BM□C is

made to order.

Valve mounting location

from the left-hand side

when facing the 4(A),

Mounting base



For direct piping Not available with double solenoid

-39

DIN connector

Α

Cannot be used with -L



-54



Built-in LED indicator

-A200-4E2

-A203-4E2



mounting a valve.

basic model code.

For details, see p.171.

Built-in flywheel diode

Specify the valve type for each station.



Only for DC24V

Sub-base regulator

-39

-13 -14

● Enter -BP when closing a station with a block-off plate without

When ordering the non-ion specification, enter -NCU after the





Block-off plate

-L

-SR

AC100V

AC200V

For DC24V only.

as standard.

Not available with DIN

connector

For AC100V and

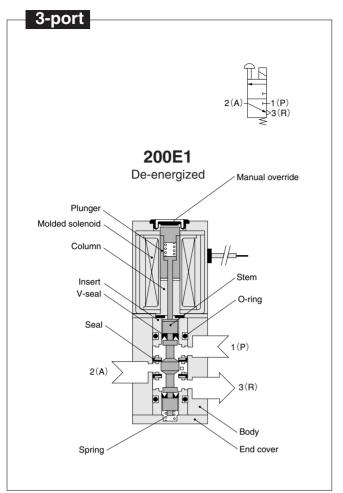
AC200V, equipped

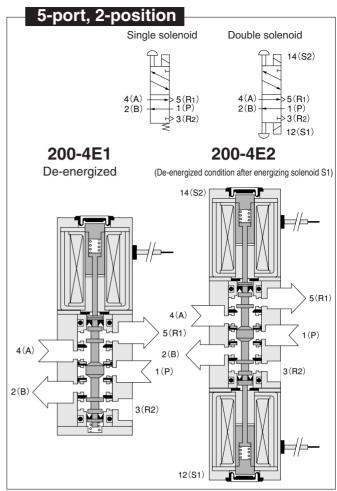


● For **BM**□**A** manifold only -52: 1(P) port pressure

regulating -54: 2(B) port pressure regulating

Operating Principles and Symbols

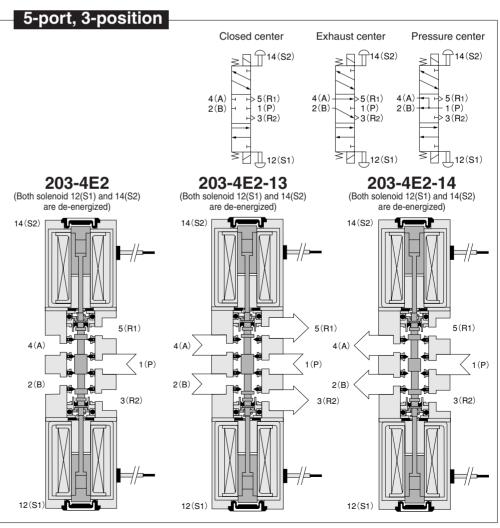




Major Parts and Materials

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

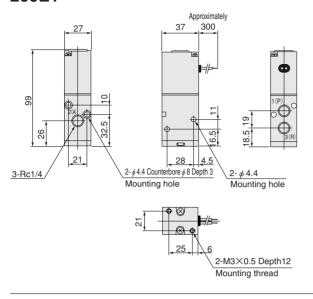
Remark: Materials that generate copper ions are not used for the non-ion specification.



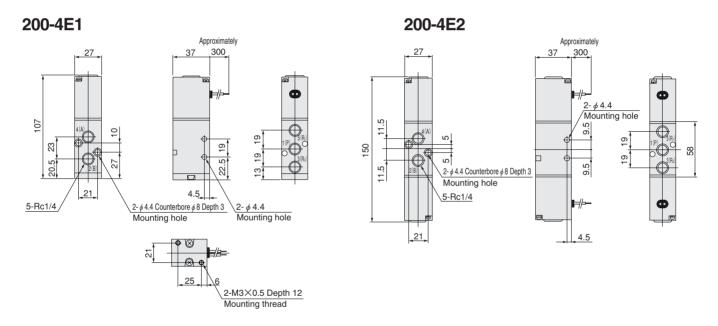
Dimensions of Solenoid Valve (mm)

2-, 3-port

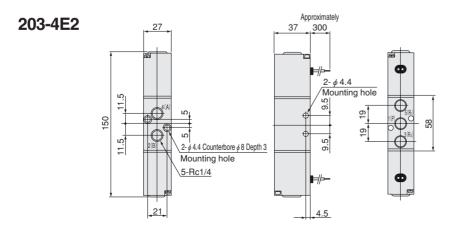
200E1



5-port, 2-position



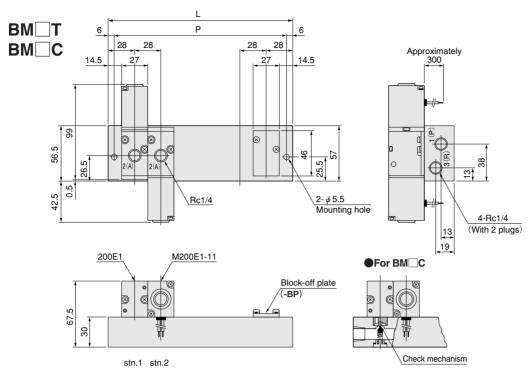
5-port, 3-position



For options, see p.170.

Dimensions of Manifold (mm)

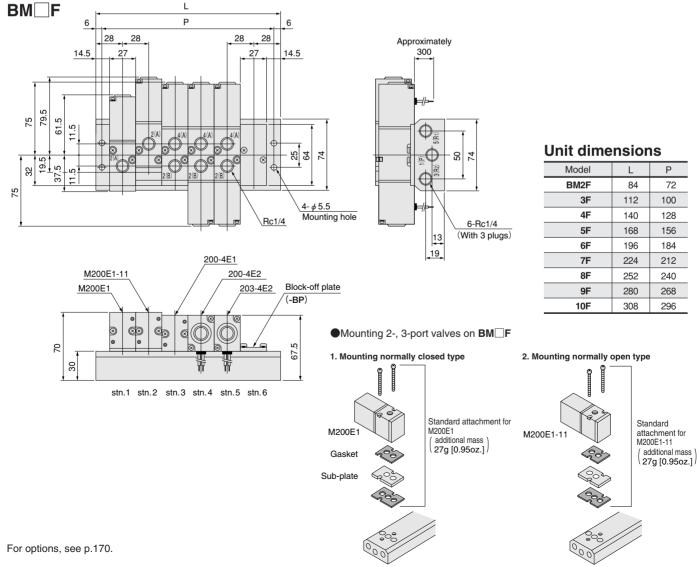
For 2-, 3-port



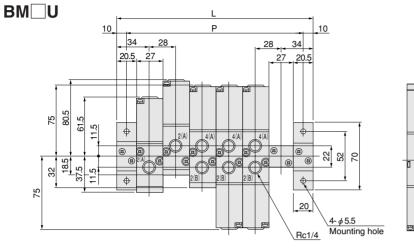
Unit dimensions

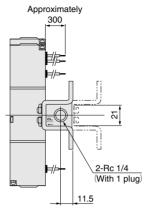
onit annonsions				
Мо	del	L	Р	
BM2T	вм2С	84	72	
3Т	3C	112	100	
4T	4C	140	128	
5T	5C	168	156	
6T	6C	196	184	
7T	7C	224	212	
8T	8C	252	240	
9T	9C	280	268	
10T	10C	308	296	

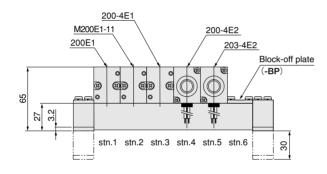
For combination mounting of 2-, 3-, 5-port



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

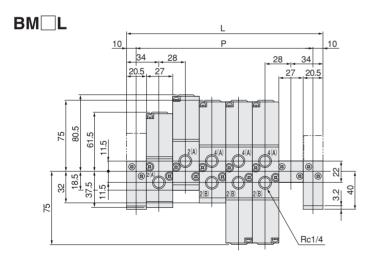


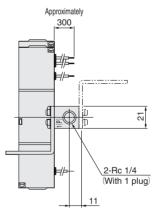


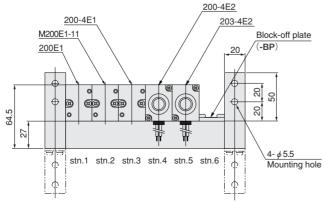


Unit dimensions

Model	L	Р
BM2U	96	76
3U	124	104
4U	152	132
5U	180	160
6U	208	188
7U	236	216
8U	264	244
9U	292	272
10U	320	300







Unit dimensions

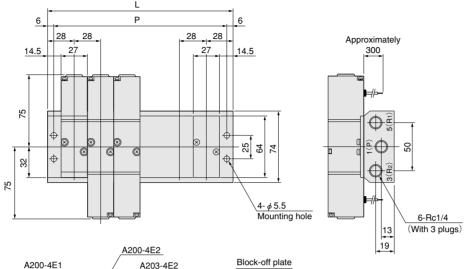
Unit dimensions		
Model	L	Р
BM2L	96	76
3L	124	104
4L	152	132
5L	180	160
6L	208	188
7L	236	216
8L	264	244
9L	292	272
10L	320	300

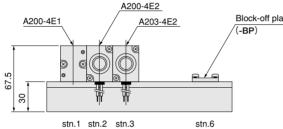
For options, see p.170.

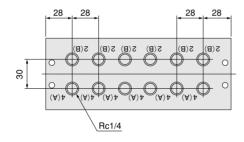
Dimensions of Manifold (mm)

For 5-port

$BM\square A$







Unit dimensions

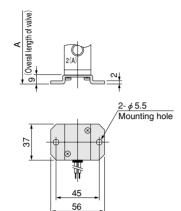
Model	L	Р
BM2A	84	72
3A	112	100
4A	140	128
5A	168	156
6A	196	184
7A	224	212
8A	252	240
9A	280	268
10A	308	296

For options, see p.170.

Dimensions of Options (mm)

For single unit

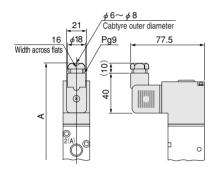
●Mounting base: -21



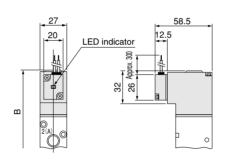
Model	Code	Α
200E1		108
200-4E1		116

For single unit and manifold

● Solenoid with DIN connector: -39

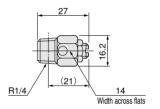


Solenoid with LED indicator: -L



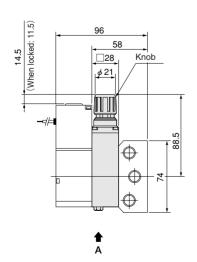
Code	А	В	Remark	
200E1	117	99		
200-4E1	125	107	Overall length of value	
200-4E2	186	150	Overall length of valve	
203-4E2	203-4E2			

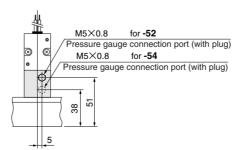
Speed controller: -70 Note: Not available in 2-, 3-port



For manifold

●Sub-base regulator: -52 -54





⟨Viewed from **A**⟩

Note: When mounting the sub-base regulator, the solenoid valve lead wire direction is reversed (solenoid rotated).

For details, see p.171.

Sub-base Regulator

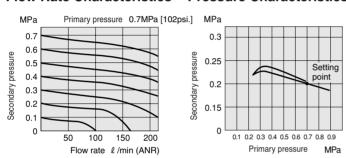


Specifications

Order code	-52 (BMA-52) ^{Note}	-54 (BMA-54) ^{Note}
Functions	1(P) port pressure regulating type	2(B) port pressure regulating type
Media	Air	
Operating pressure range MPa {kgf/cm²} [psi.]	0.05~0.7 {0.5~7.1} [7~102]	
Maximum operating pressure MPa {kgf/cm²} [psi.]	0.9 {9.2} [131]	
Proof pressure MPa {kgf/cm²} [psi.]	1.35 {13	.8} [196]
Operating temperature range °C [°F]	5~60 [4	1~140]
Mass g [oz.]	200 [7.05]

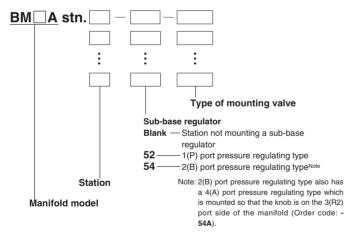
Note: Order codes in parentheses () are those for the sub-base regulator which must be ordered separately.

Flow Rate Characteristics Pressure Characteristics



1MPa = 145psi., 1 \(\ell \) /min = 0.0353ft3/min.

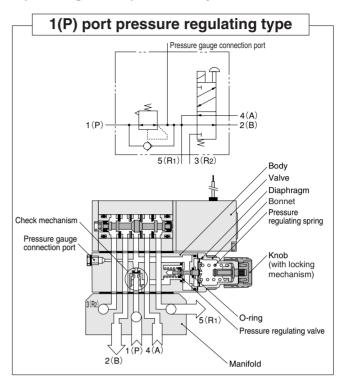
Order Code

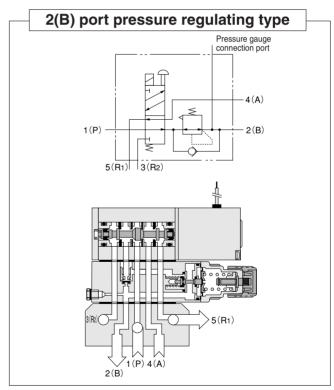


● For sub-base regulator only

BMA-52——1(P) port pressure regulating type **BMA-54**——2(B) port pressure regulating type

Operating Principles and Symbols





Major Parts and Materials

Parts	Materials	
Body	Aluminum alloy (anodized)	
Knob	Plastic (POM)	
Diaphragm	Synthetic rubber (NBR)	
Pressure regulating spring	Piano wire (chromating)	
Seal	Synthetic rubber (NBR)	

Handling Instructions and Precautions



Solenoid

Internal circuit

●DC24V

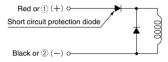
Standard solenoid



Solenoid with LED indicator

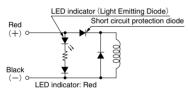
Order code: -L Red (+) Blue (-) LED indicator (Light Emitting Diode)

Solenoid (Surge suppression) Order code: -SR

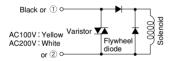


① and ② are for with DIN connector (order code: -39).

Solenoid with LED indicator (Surge suppression) Order code: -L-SR

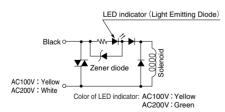


● AC100V, AC200V (Surge suppression) Standard solenoid



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

Solenoid with LED indicator Order code: -L



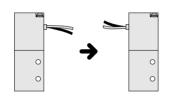
- Cautions: 1. Do not apply megger between the lead wires.
 - The DC solenoid will not short circuit even if the wrong polarity is applied, but the valve will not operate.
 - 3. Leakage current inside the circuit could result in failure of the solenoid valve to return, or in other erratic operation. 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.

Changing lead wire direction

The lead wire direction can be changed in the case of the add-on mounting of a subbase regulator, etc.

Remove the two solenoid mounting screws, and rotate the solenoid 180 degrees to change the lead wire direction.



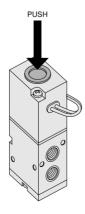


Manual override

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).



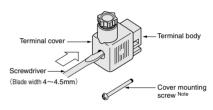


DIN connector

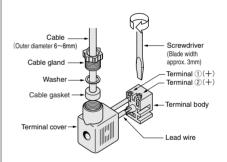
Wiring instructions

Remove the cover mounting screws, and lift the terminal cover off from the solenoid. Use a screwdriver (blade width $4\sim4.5$ mm [$0.16\sim0.18$ in.]), 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 $6 \sim 8 \text{mm}$ [0.24 $\sim 0.31 \text{in.}$]), 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.]).



Note: The appropriate tightening torque for the cover mounting screw is 29.4N·cm {3kgf·cm} [2.6in·lbf].





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

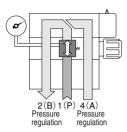


Sub-base regulator

Application example

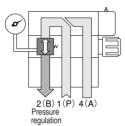
1(P) port pressure regulating type Order code: -52

The 4(A) and 2(B) ports are regulated to the same pressure



●2(B) port pressure regulating type Order code: -54

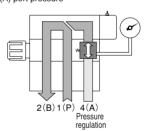
Regulates 2(B) port pressure



2(B) port pressure regulating type

Order code: -54

While using the 2(B) port pressure regulating type to regulate 4(A) port pressure



When the 2(B) port pressure regulating type (order code: -54) is used to regulate 4(A) port pressure, mount the sub-base regulator so that the knob is on the 3(R2) port side of the manifold.

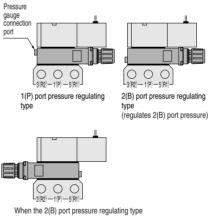
Pressure regulation

- 1. Connect a pressure gauge to check the pressure setting. A compact pressure gauge (Model G1-20) is recommended.
- 2. To regulate the pressure, pull the knob out firmly, and turn it to the right (clockwise rotation) to increase the pressure, and to the left (counterclockwise rotation) to reduce the pressure. After pressure regulation, push the knob back into the body and lock in place.

Mounting

The sub-base regulator is mounted between the manifold and the valve. While the subbase regulator's knob is on the 5(R1) port side of the manifold for the standard type, the knob for the 2(B) port pressure regulating type is mounted so that the handle comes to the 3(R2) port side of the manifold, and can also regulate the pressure of the 4(A) port. For mounting directions and functions, see the Application example.

Cautions: 1. Pay attention to the sub-base regulator facing and the front/back sides when newly mounting a subbase regulator, or when changing the pressure regulating port. In the 1(P) port pressure regulating type: -52, the knob is on the 5(R1) side, and the pressure gauge connection port is on the valve side. In the 2(B) port pressure regulating type: -54, the knob is on the 5(R1) side for 2(B) port pressure regulation, and on the 3(R2) side for 4(A) port pressure regulation. In both cases, the pressure gauge connection port is on the manifold side.



is used to regulate 4(A) port pressure

2. When the solenoid is a grommet type, change the solenoid orientation after confirming the "Changing lead wire direction" on the previous page, to prevent interference between the lead wires and the sub-base regulator.