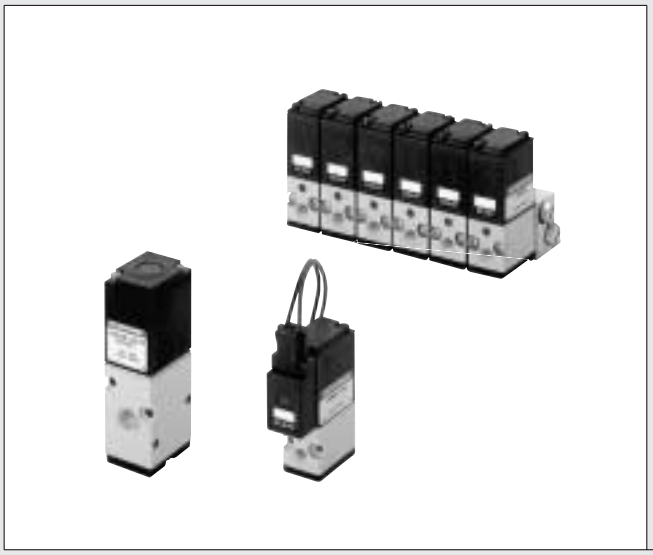


KOGANEI

VALVES GENERAL CATALOG

SQUARE TYPE SOLENOID VACUUM VALVES

INDEX

Field proven mechanism offers reliable vacuum application and durability.

SQUARE TYPE SOLENOID VACUUM VALVES

Rational mechanism, pursuing ease of use and reliability, achieves proven results and ensured operation. High performance 2-, 3-port direct acting solenoid vacuum valve series is available in the solenoid valves 030, 050, 100, and 200 series.

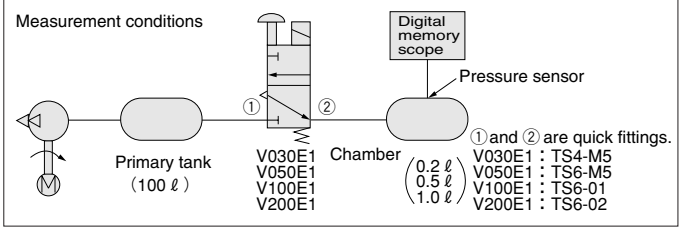
- The V030 series is a space-saving, low current type capable of handling multiple vacuum pads on a one-to-one basis. A choice of wiring type is offered. Surge-suppression measures are standard for both AC and DC.
- The V100 and V200 series can be used as NC (normally closed) and NO (normally open) 2-, 3-port valves with flexibility on piping ports and flow directions, and can also demonstrate their true value as selector valves (dual-pressure switching valves) or divider valves.
  The 3-port valve V030, V050, SV100 and SV200 series offers excellent reliability even when used in positive pressure applications, and is therefore optimum valve for use as a vacuum break or releasing workpiece valve.
- A flywheel diode is standard equipment on AC solenoids (except for V030, optional on the DC24V model), eliminating solenoid burning or humming.

Caution: Solenoid valves that can be used for vacuum applications include variations of the G010 series, the 112 and 182 series, and the F series. For details, see the pages of each series.

How to read the graph

Exhaust time: Time required for chamber inside to convert from atmospheric pressure state to vacuum state.

Air supply time: Time required for chamber inside pressure from –100kPa [–14.5psi.] to atmospheric pressure state.



Solenoid vacuum valves 030 series

V030E1 (standard type)

- Uses a low current 65mA, 1.6A (DC24V) solenoid.
- Compact and lightweight with 15mm [0.591in.] width and 57g [2.01oz.] single-unit mass.

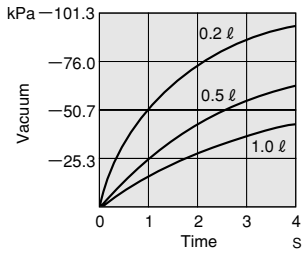
<Main specifications>

Effective area〔Cv〕 ····· 1(P)→2(A): 0.6mm²〔0.02〕,
2(A)→3(R): 0.8mm²〔0.03〕

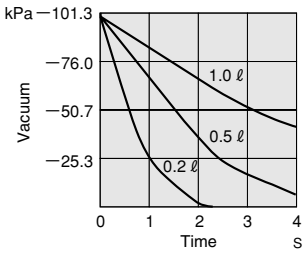
Port size ····· 1(P), 2(A): M5×0.8, R: ϕ 1.8

Operating pressure range ··· −100～0kPa [−14.5～0psi.]

Exhaust time



Air supply time



1kPa = 0.145psi.

Solenoid vacuum valves 050 series

Standard type V050E1/Low current type V050LE1

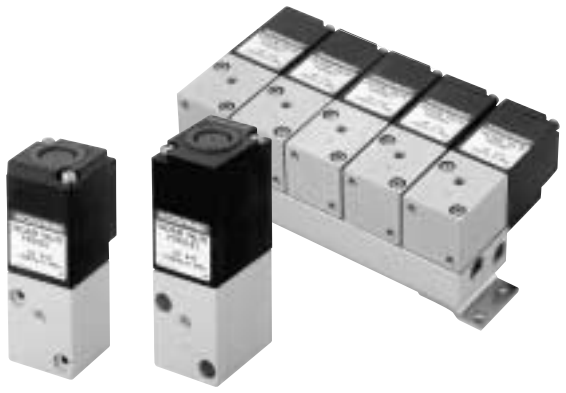
- Offers combined use of both vacuum and positive pressure states.
- Uses a poppet-type seal. Minimal problems of sticking due to collected liquid, for assured switching operations.

<Main specifications>

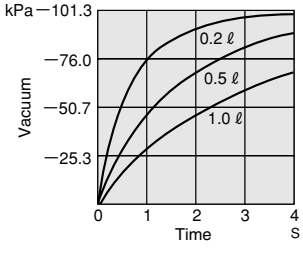
Effective Area〔Cv〕 ····· 1.5mm²〔0.08〕

Port size ····· M5×0.8 (Rc1/8)

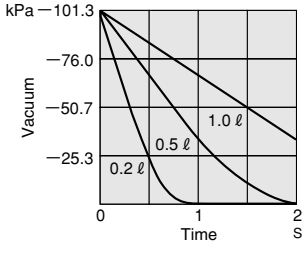
Operating pressure range ··· −100～0kPa [−14.5～0psi.]
0～0.7MPa [0～102psi.]



Exhaust time



Air supply time



1kPa = 0.145psi.

Valve functions and connection port configurations

V030, V050

When not using positive pressure

		De-energized	Energized
2-port	Normally closed (NC)	2(A) 1(P) (vacuum pump, etc.) 3(R) (plug)	
	Normally open (NO) (V050 only)	2(A) 1(P) (vacuum pump, etc.) 3(R) (plug)	
3-port	Normally closed (NC)	2(A) 1(P) (vacuum pump, etc.) 3(R) (atmosphere)	
	Normally open (NO) (V050 only)	2(A) 1(P) (vacuum pump, etc.) 3(R) (atmosphere)	

When using both vacuum and positive pressure (**V050** only)

3-port	Normally closed (NC)	2(A) 1(P) (positive pressure) 3(R) (vacuum pump, etc.)	
	Normally open (NO)	2(A) 1(P) (positive pressure) 3(R) (vacuum pump, etc.)	

V100, V200

		De-energized	Energized
2-port	Normally closed (NC)	2(A) 1(P) (vacuum pump, etc.) 3(R) (plug)	
	Normally open (NO)	2(A) 1(P) (plug) 3(R) (vacuum pump, etc.)	
3-port	Normally closed (NC)	2(A) 1(P) (vacuum pump, etc.) 3(R) (atmosphere)	
	Normally open (NO)	2(A) 1(P) (atmosphere) 3(R) (vacuum pump, etc.)	
Selector valve		2(A) 1(P) (vacuum pump, etc.) 3(R) (vacuum pump, etc.)	
Divider valve		(vacuum pump, etc.) 2(A) 1(P) 3(R)	

SV100, SV200

3-port	Normally closed (NC)	2(A) 1(P) (positive pressure) 3(R) (vacuum pump, etc.)	
	Normally open (NO)	2(A) 1(P) (vacuum pump, etc.) 3(R) (positive pressure)	

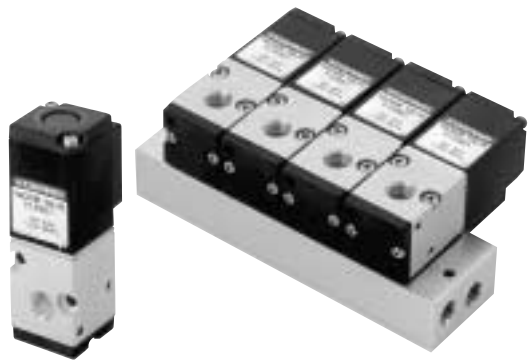
Solenoid vacuum valves 100 series

Standard type V100E1/For both vacuum and positive pressure type SV100E1

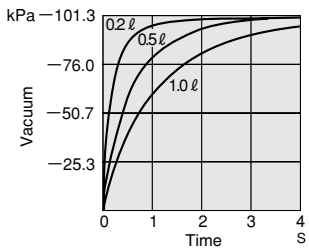
●Uses a pressure-balance poppet for equalizing the air supply pressure at the valve seat portion.
Small operating force suitable for high-cycled operations, offering large flow rate in a compact body.

<Main specifications>

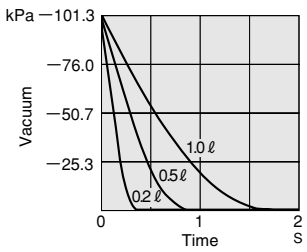
Effective Area〔Cv〕 ……5.0mm²〔0.28〕
Port size ……Rc1/8
Operating pressure range …−100～0kPa [−14.5～0psi.] (**V100E1**)
−100～0kPa [−14.5～0psi.],
0～0.9MPa [0～131psi.] (**SV100E1**)



Exhaust time



Air supply time



1kPa = 0.145psi.

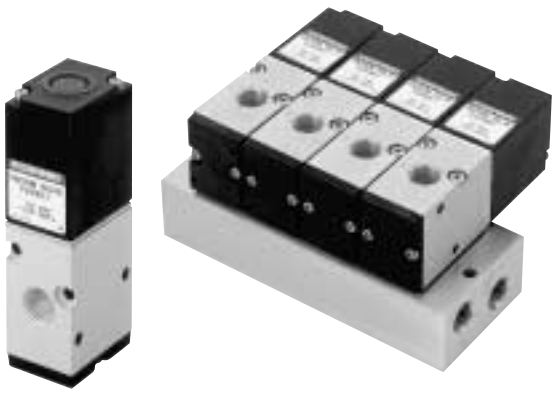
Solenoid vacuum valves 200 series

Standard type V200E1/For both vacuum and positive pressure type SV200E1

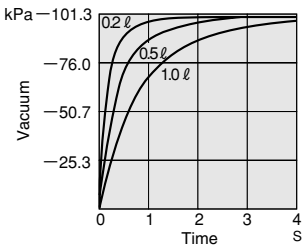
●As in the 100 series, uses a pressure-balance poppet for equalizing the air supply pressure at the valve seat portion. Small operating force suitable for high-cycled operations, offering large flow rate in a compact body.

<Main specifications>

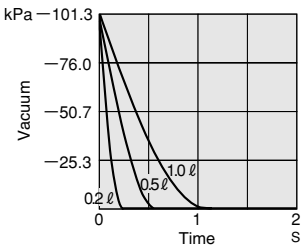
Effective Area〔Cv〕 ……8.5mm²〔0.47〕
Port size ……Rc1/4
Operating pressure range …−100～0kPa [−14.5～0psi.] (**V200E1**)
−100～0kPa [−14.5～0psi.],
0 ～0.9MPa [0～131psi.] (**SV200E1**)



Exhaust time



Air supply time



1kPa = 0.145psi.

SQUARE TYPE SOLENOID VACUUM VALVES

V030 Series

Specifications

Item \ Basic model		V030E1
Media		Vacuum
Operation type		Direct acting type
Number of positions, Number of ports		2 positions, 2, 3 ports
Valve function		Normally closed (NC)
Effective area〔Cv〕 mm²		1(P)→2(A): 0.6〔0.02〕, 2(A)→3(R): 0.8〔0.03〕
Port size		1(P), 2(A): M5×0.8, 3(R): ϕ 1.8
Lubrication		Not required
Operating pressure range kPa {mmHg} [in.Hg]		−100～0 {−750.1～0} [−29.53～0]
Response time Note ms ON/OFF	DC12V, 24V	10/25 or below
	AC100V, AC200V	15/40 or below
Maximum operating frequency Hz		5
Operating temp. range (atmosphere and media) °C [°F]		5～50 [41～122]
Shock resistance m/s² {G}	Lateral direction	1373.0 {140.0}
	Axial direction	117.7 {12.0}
Mounting direction		Any
Mass g [oz.]		57 [2.01]

Note: Values when vacuum is −100kPa {−750.1㎜Hg} [−29.53in.Hg].

Solenoid Vacuum Valve Port Size

Solenoid vacuum valve model	Port specification	Port size
V030E1	Female thread	1(P), 2(A): M5×0.8
	———	3(R): ϕ 1.8

Manifold Connection Port Size

Manifold model	Port	Location of piping connection	Port size
YM□T	1(P)	Manifold	M5×0.8
	3(R)		M6×1
	2(A)	Valve	M5×0.8

Manifold Mass

g [oz.]

Manifold model	Mass calculation of each unit (n=Number of units)	Block-off plate
YM□T	(11×n)−1 [(0.39×n)−0.04]	3 [0.11]

Solenoid Specifications

Item \ Rated voltage		DC12V	DC24V	AC100V		AC200V	
Type		Flywheel diode incorporated for surge suppression	Flywheel diode type	Shading type			
Operating voltage range V		10.8～13.2 (12±10%)	21.6～26.4 (24±10%)	90～132 (100 $^{+32}_{-10}$ %)		180～264 (200 $^{+32}_{-10}$ %)	
Current (when rated voltage is applied)	Frequency Hz	———	———	50	60	50	60
	Starting mA (r.m.s.)	———	———	36	32	18	16
	Energizing mA (r.m.s.)	130 (1.6W) 〔140 (1.7W) with LED indicator〕	65 (1.6W) 〔75 (1.8W) with LED indicator〕	24	20	12	10
Allowable leakage current mA		8	4	4		2	
Insulation resistance MΩ		Over 100					
Wiring type and lead wire length	Standard	Grommet type: 300mm [11.8in.]					
	Optional	Plug connector type: 300mm [11.8in.] See made to order on p.856.					
Color of lead wire		Brown (+), Black (−)	Red (+), Black (−)	Yellow		White	
Color of LED indicator		Red		Yellow		Green	
Surge suppression (as standard)		Flywheel diode		Varistor			

Order Codes

Solenoid Vacuum Valve Order Codes

Basic model	Option: Valve function (2-port)	Option: Manual override (Locking protruding type)	Solenoid option: Connector with LED indicator	Voltage
Direct piping for 2-, 3-port normally closed	**V030E1**	**-2**	**-83**	Straight connector: **-PSL** L connector: **-PLL**	**DC12V, DC24V** **AC100V, AC200V**

- **V030E1**: When ordering the non-ion specification, enter **-NCU** after the basic model code.
- **-2**: Blank: 3-port
- **-83**: Standard: Non-locking type
- **-PSL / -PLL**: Standard: Grommet type
  Color of LED indicator
  DC12V: Red
  DC24V: Red
  AC100V: Yellow
  AC200V: Green
- **DC12V, DC24V / AC100V, AC200V**: For DC 24V, a flywheel diode for surge suppression is equipped as standard.

Manifold Order Codes

Manifold model			Station	Valve model: Basic model	Option: 2-port	Option: Locking protruding type manual override	Solenoid option: Connector with LED indicator	Voltage
YM	**2** ⋮ **10**	**T**	**stn.□** ⋮ **stn.□**	**V030E1**	**-2**	**-83**	Straight connector: **-PSL** L connector: **-PLL**	**DC12V, DC24V** **AC100V, AC200V**

- **stn.□ ⋮ stn.□**: Valve mounting location from the left-hand side when facing the 2(A) port.
- **V030E1**: When ordering the non-ion specification, enter **-NCU** after the basic model code.
- **-2**: Blank: 3-port
- **-83**: Standard: Non-locking type
- **-PSL / -PLL**: Standard: Grommet type
  Color of LED indicator
  DC12V: Red
  DC24V: Red
  AC100V: Yellow
  AC200V: Green
- **DC12V, DC24V / AC100V, AC200V**: For DC 24V, a flywheel diode for surge suppression is equipped as standard.

Additional Parts

Muffler

● For manifold only

Mounting base

Block-off plate

● YM T -BP
- **T**—For T type manifold
- **YM**—For YM

Options

Locking protruding type manual override

Straight connector with LED indicator

L connector with LED indicator

Made to Order For details, see the Solenoid Valves 030 Series.

Straight connector with LED indicator

- Without lead wire
- Connector and contacts included

L connector with LED indicator

- Without lead wire
- Connector and contacts included

Lead wire length

- For plug connector
- Length (mm) **-1L**: 1000 [39in.]
  -3L: 3000 [118in.]

DIN connector

- Cannot be used with -L

LED indicator with built-in varistor

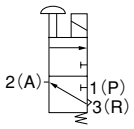
- Cannot be used with -39

Built-in interface unit

- Enables direct control by output from micro computer or other logic devices
- With LED indicator

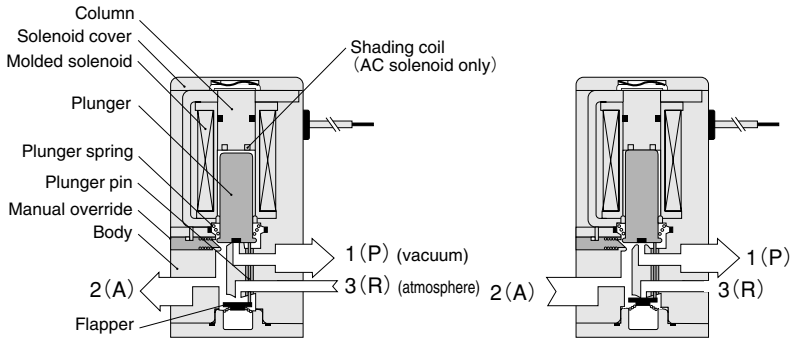
Operating Principles and Symbol

Normally closed (NC)



V030E1

De-energized **Energized**



Note: Unable to plumb directly to the 3(R) port.

Valve functions and connection port configurations

V030

		De-energized	Energized
2-port	Normally closed (NC)	2(A) → 1(P) (vacuum pump, etc); 3(R) (plug)	
3-port	Normally closed (NC)	2(A) → 1(P) (vacuum pump, etc); 3(R) (atmosphere)	

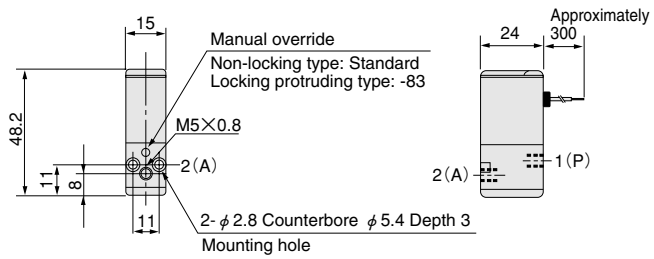
Major Parts and Materials

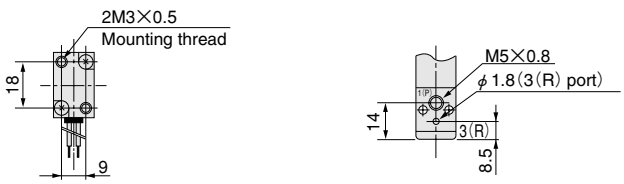
Parts		Materials
Valve	Body	Aluminum alloy (anodized)
	O-ring	Synthetic rubber
	Flapper	
	Plunger	Magnetic stainless steel
	Column	
	Spring	Stainless steel
	Mounting base	Mild steel (zinc plated)
Manifold	Body	Aluminum alloy (anodized)
	Block-off plate	Mild steel (zinc plated)
	Bracket	
	Seal	Synthetic rubber

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

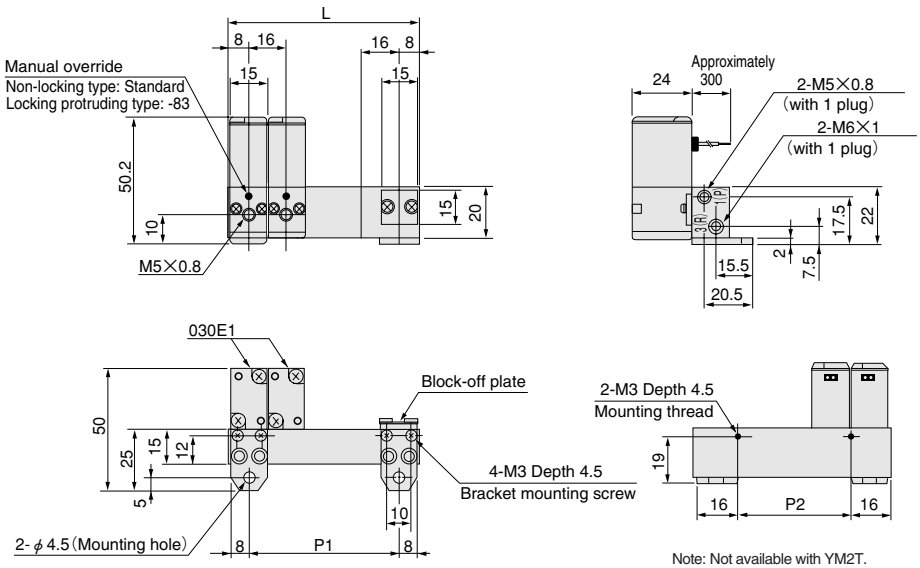
Dimensions of Solenoid Vacuum Valve (mm)

V030E1





YM□T



Note: Not available with YM2T.

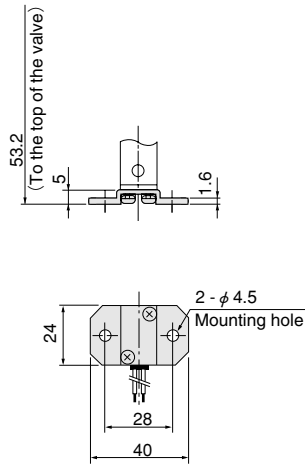
Unit dimensions

mm

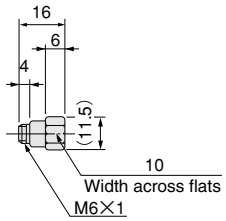
Model	L	P1	P2
YM2T	32	16	—
YM3T	48	32	16
YM4T	64	48	32
YM5T	80	64	48
YM6T	96	80	64
YM7T	112	96	80
YM8T	128	112	96
YM9T	144	128	112
YM10T	160	144	128

Additional Parts (To be ordered separately)

●Mounting base: **030-21**

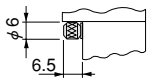


●Muffler: **-75**
For manifold only

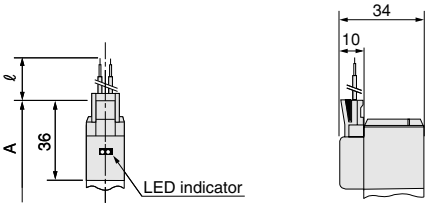


Options

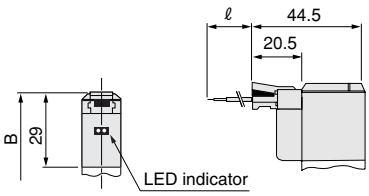
●Locking protruding type manual override: **-83**



●Solenoid with straight connector: **-PSL**

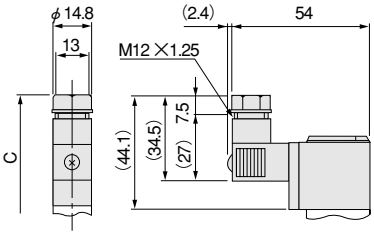


●Solenoid with L connector: **-PLL**

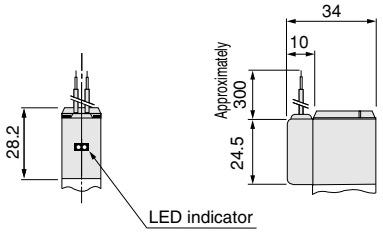


Made to Order

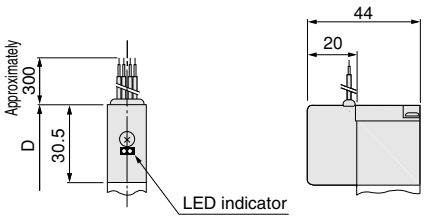
●Solenoid with DIN connector: **-39**



●Solenoid with LED indicator: **-L**



●Built-in interface unit: **-FA**



mm

Model \ Code	A	B	C	D	ℓ (lead wire length)	Remark
V030E1	56	49	64.1	50.5	**-PSL, -PLL:** 300 Made to order: **-1L** ; 1000 **-3L** ; 3000	Overall length to the end of the valve

SQUARE TYPE SOLENOID VACUUM VALVES

V050 Series

V050E1 V050LE1

Specifications

Item \ Basic model		Standard type	Low current type
		V050E1	**V050LE1**
Media		Vacuum, air	
Operation type		Direct acting type	
Number of positions, Number of ports		2 positions, 2, 3 ports	
Valve function		Normally closed (NC, standard)[Note 1] or normally open (NO, optional)	
Effective area〔Cv〕 mm²		1.5〔0.08〕	
Port size [Note 2]		M5×0.8	
Lubrication		Not required	
Operating pressure range kPa {mmHg} [in.Hg]		−100～0 {−750.1～0} [−29.53～0], 0～0.7MPa {0～7.1kgf/cm²} [0～102psi.]	
Proof pressure MPa {kgf/cm²} [psi.]		1.03 {10.5} [149]	
Response time [Note 3] ms ON/OFF	DC24V	20/20 or below	30/30 or below
	AC100V, AC200V	25/25 or below	——
Maximum operating frequency Hz		5	
Operating temp.range (atmosphere and media) °C [°F]		0～50 [32～122]	
Shock resistance m/s² {G}	Lateral direction	1373.0 {140.0}	
	Axial direction	294.2 {30.0}	
Mounting direction		Any	
Mass [Note 4] g [oz.]		190 [6.70] (185 [6.53])	295 [10.41] (290 [10.23])

Notes: 1. When using both vacuum and positive pressure, the positive pressure side is normally closed.
2. For details, see the port size.
3. Values when the vacuum is −100kPa {−750.1mmHg} [−29.53in.Hg].
4. Figures in parentheses ( ) show the mass of the valve with a port size of Rc1/8 (optional: **-01**).

Solenoid Vacuum Valve Port Size

Basic model		Port specification	Port size
V050E1 **V050LE1**	Standard	Female thread	M5×0.8
	Optional	Female thread	P, A port: Rc1/8 R port: M5×0.8

Manifold Connection Port Size

Manifold model	Port	Location of piping connection	Port size
SM□	1(P)	Manifold	Rc 1/8
	2(A)	Valve	M5×0.8[Note]
	3(R)	Manifold	Rc 1/8

Note: When mounting standard valve. In the option: **-01**, port size is Rc1/8.

Manifold Mass

g [oz.]

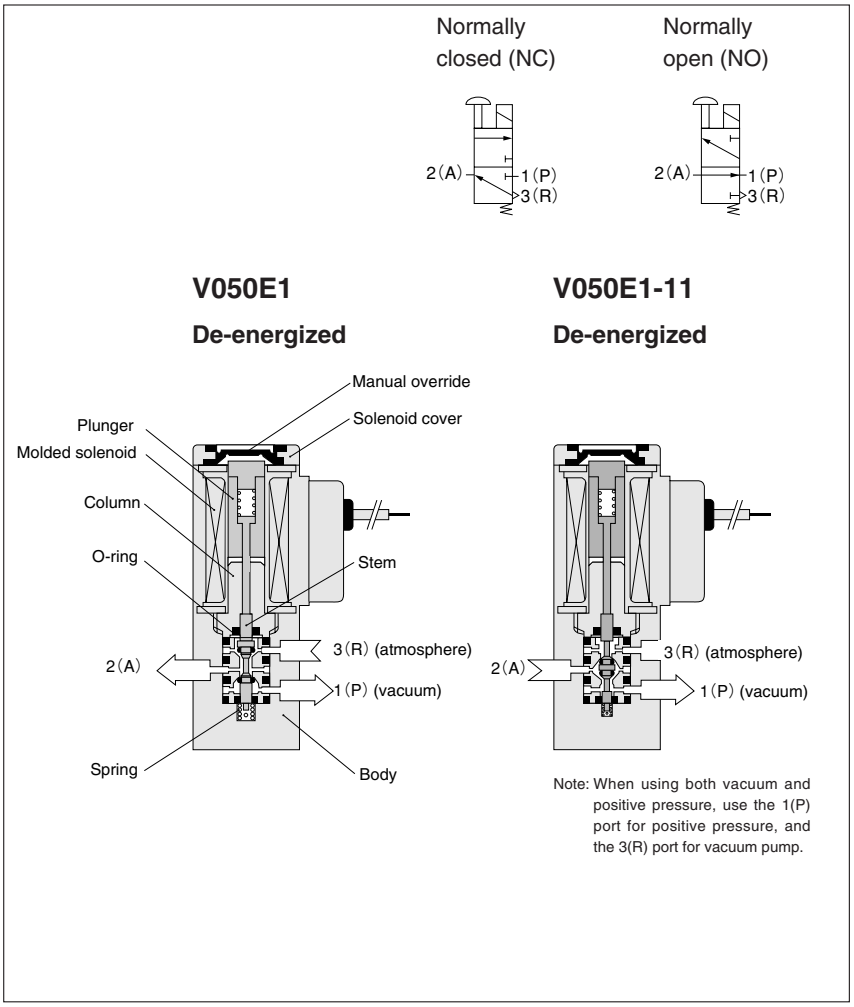
Manifold model	Mass calculation of each unit (n=Number of units)	Block-off plate
SM□	(47×n)+30 [(1.66×n)+1.06]	20 [0.71]

Solenoid Specifications

Item \ Rated voltage		Standard type					Low current type
		DC24V	**AC100V**		**AC200V**		**DC24V**
Type		DC type	Flywheel diode type				DC type
Operating voltage range V		21.6～26.4 (24±10%)	90～110 (100±10%)		180～220 (200±10%)		21.6～26.4 (24±10%)
Current [Note 1] (when rated voltage is applied)	Frequency Hz	——	50	60	50	60	——
	Energizing [Note 2] mA (r.m.s.)	240 (5.8W) 〔252 (6.0W)〕	74 〔83〕	71 〔79〕	48 〔50〕	46 〔48〕	100 (2.4W) 〔112 (2.7W)〕
Allowable leakage current mA		20	10		5		10
Insulation resistance MΩ		10					10
Wiring type and lead wire length	Standard	Grommet type: 300mm [11.8in.]					Grommet type: 300mm [11.8in.]
	Optional	With DIN connector					With DIN connector
Color of lead wire		Red 〔Red (+), Blue (−)〕 [Note 1] Red (+), Black (−) [Note 3]	Yellow, Black		White, Black		Red 〔Red (+), Blue (−)〕 [Note 1] Red (+), Black (−) [Note3]
Color of LED indicator (optional)		Red	Yellow		Green		Red
Surge suppression	Standard	——	Flywheel diode				——
	Optional	Flywheel diode	——				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 LED indicators and surge suppression.

Operating Principles and Symbols



Valve functions and connection port configurations

V050

When not using positive pressure

		De-energized	Energized
2-port	Normally closed (NC)	2(A) → 1(P) (vacuum pump, etc.), 3(R) (plug)	
	Normally open (NO)	2(A) → 1(P) (vacuum pump, etc.), 3(R) (plug)	
3-port	Normally closed (NC)	2(A) → 1(P) (vacuum pump, etc.), 3(R) (atmosphere)	
	Normally open (NO)	2(A) → 1(P) (vacuum pump, etc.), 3(R) (atmosphere)	

When using both vacuum and positive pressure

3-port	Normally closed (NC)	2(A) → 1(P) (positive pressure), 3(R) (vacuum pump, etc.)	
	Normally open (NO)	2(A) → 1(P) (positive pressure), 3(R) (vacuum pump, etc.)	

Major Parts and Materials

Parts		Materials
Valve	Body	Aluminum alloy (anodized)
	Stem	Brass
	O-ring	Synthetic rubber
	Mounting base	Mild steel (zinc plated)
	Spring	Piano wire
	Plunger	Magnetic stainless steel
	Column	Magnetic steel
Manifold	Body	Aluminum alloy (anodized)
	Block-off plate	Mild steel (zinc plated)
	Seal	Synthetic rubber
	Mounting bracket	Mild steel (zinc plated)

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

Order Codes

Solenoid Vacuum Valve Order Codes

	Basic model	Option: Port size (Rc1/8)	Valve function: 2-port	Valve function: Normally open (NO)	Mounting base	DIN connector	LED indicator	Flywheel diode	Voltage
Standard type	V050E1	-01	-2	-11	-21	-39	-LF	-SR	DC24V, AC100V, AC200V
Low current type	V050LE1						-L		DC24V

- When ordering the non-ion specification, enter **-NCU** after the basic model code.
- When using vacuum and positive pressure, the positive pressure side is normally open.
- Not available for DIN connectors
- For DC24V only. Standard for AC100V and AC200V.

Manifold Order Codes

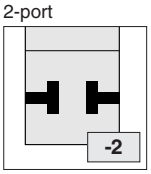
Manifold model	Number of units	Station	Valve model: Basic model	Option: Port size (Rc1/8)	2-port	Normally open (NO)	DIN connector	LED indicator	Flywheel diode	Voltage
SM	2 … 10	stn.□ … stn.□	-V050E1	-01	-2	-11	-39	-LF	-SR	DC24V, AC100V, AC200V
			-V050LE1					-L		DC24V

- Valve mounting location from the left-hand side when facing the 2(A) port
- 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.
- Not available for DIN connectors
- For DC24V only. Standard for AC100V and AC200V.

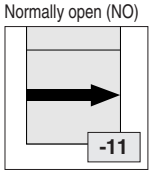
Options

Port size (Rc1/8)

2-port



Normally open (NO)



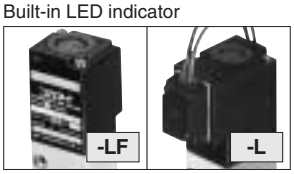
Mounting base

- For direct piping

DIN connector

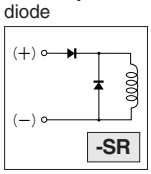
- Cannot be used with **-LF**, **-L**

Built-in LED indicator



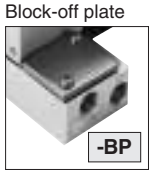
- For standard type
- For low current type

Built-in flywheel diode



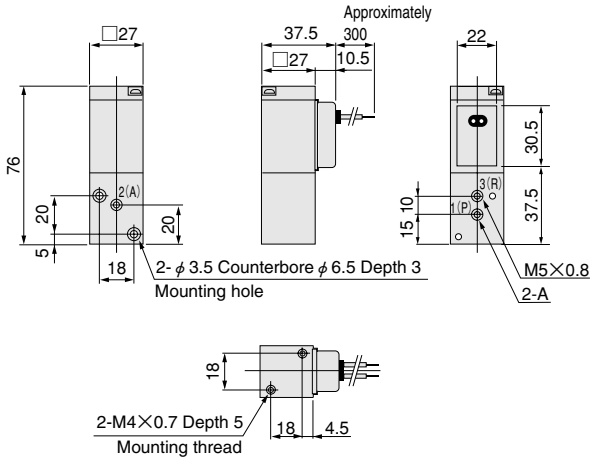
- Only for DC24V

Block-off plate



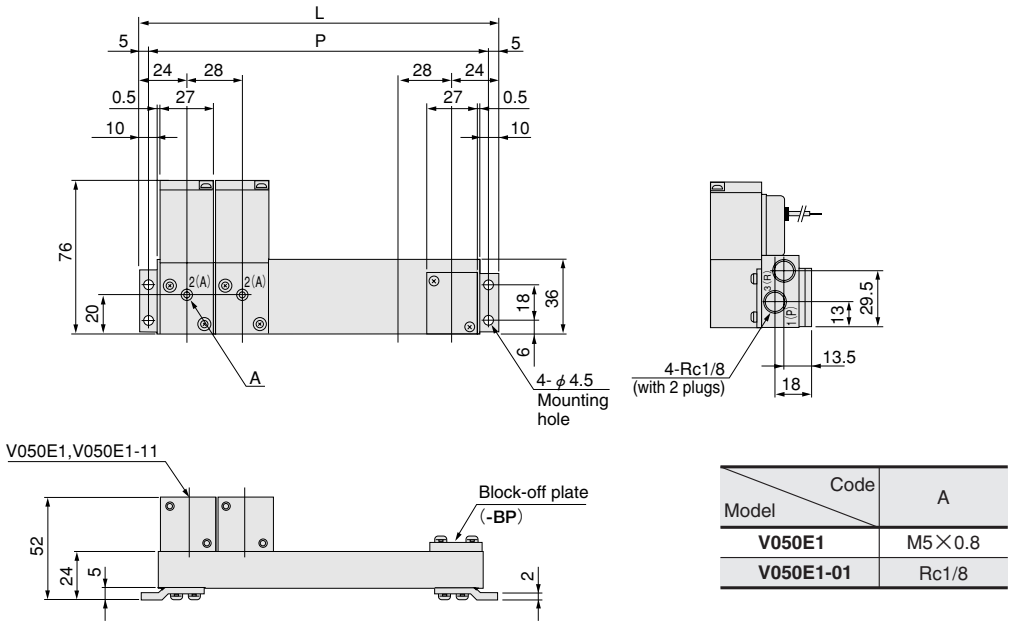
Dimensions of Standard Type (mm)

V050E1



Model \ Code	A
V050E1	M5×0.8
V050E1-01	Rc1/8

SM□



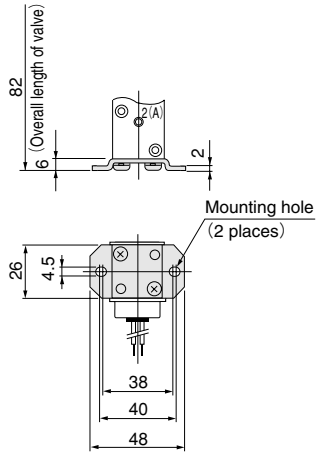
Model \ Code	A
V050E1	M5×0.8
V050E1-01	Rc1/8

Unit dimensions mm

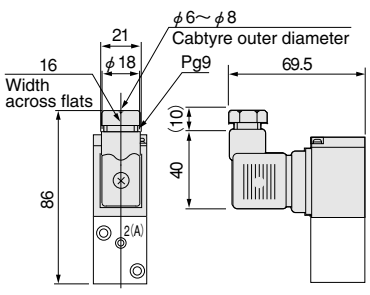
Model	L	P
SM2	76	66
SM3	104	94
SM4	132	122
SM5	160	150
SM6	188	178
SM7	216	206
SM8	244	234
SM9	272	262
SM10	300	290

Options

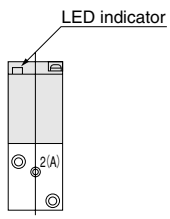
●Mounting base: **-21**



●Solenoid with DIN connector: **-39**

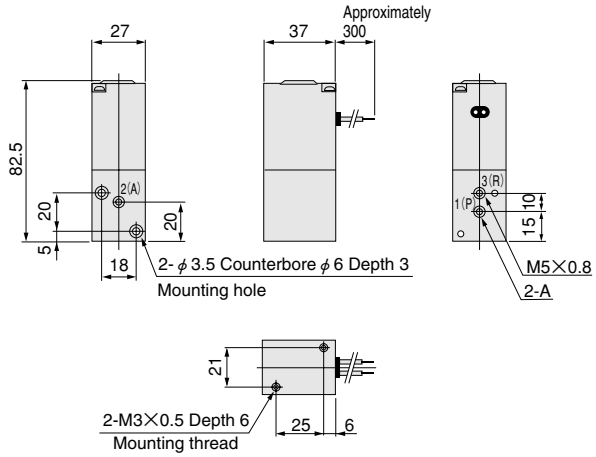


●Solenoid with LED indicator: **-LF**



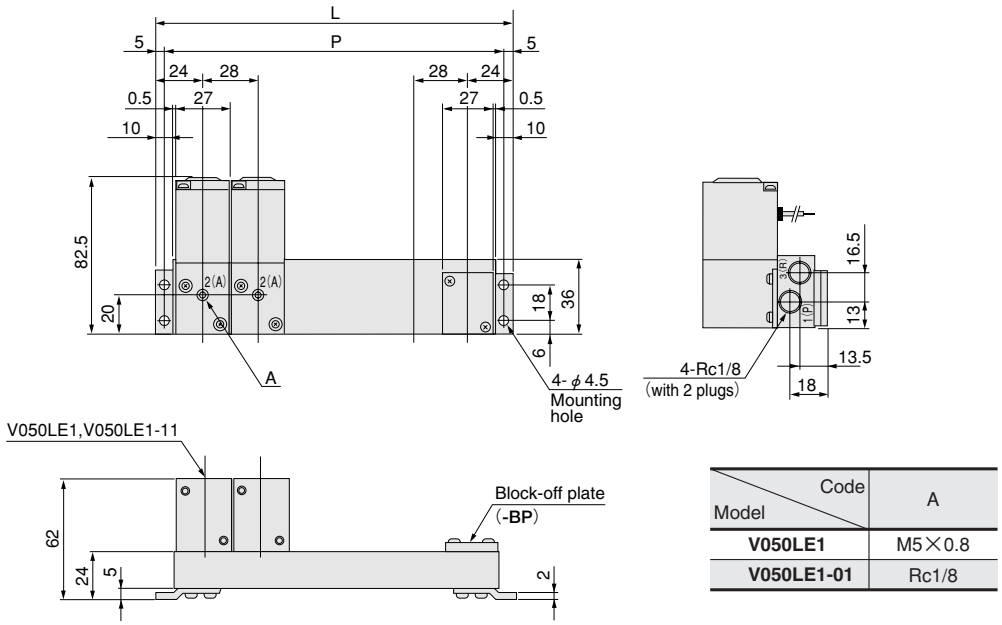
Dimensions of Low Current Type (mm)

V050LE1



Model \ Code	A
V050LE1	M5×0.8
V050LE1-01	Rc1/8

SM□



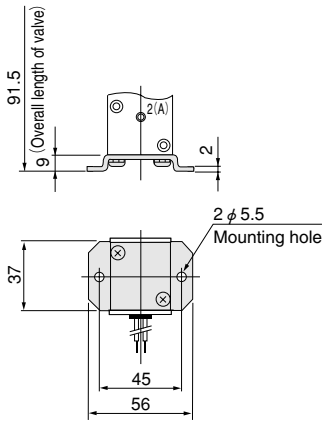
Model \ Code	A
V050LE1	M5×0.8
V050LE1-01	Rc1/8

Unit dimensions mm

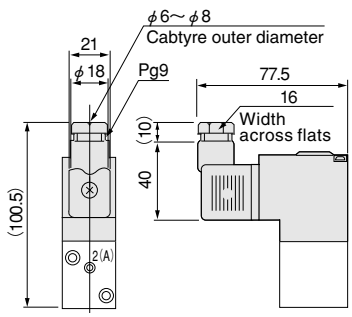
Model	L	P
SM2	76	66
SM3	104	94
SM4	132	122
SM5	160	150
SM6	188	178
SM7	216	206
SM8	244	234
SM9	272	262
SM10	300	290

Options

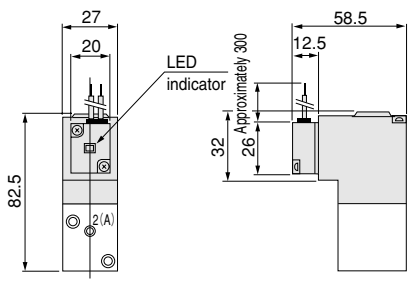
●Mounting base: **-21**



●Solenoid with DIN connector: **-39**



●Solenoid with LED indicator: **-L**



SQUARE TYPE SOLENOID VACUUM VALVES

V100 Series

Specifications

Item \ Basic model		V100E1	MV100E1-11	SV100E1	MSV100E1-11
Media		Vacuum		Vacuum and air	
Operation type		Direct acting			
Number of positions		2 positions			
Number of ports		2, 3 ports		3 ports	
Valve function		Normally closed (NC) or normally open (NO)	Normally open (NO)	Normally closed (NC)Note 1	Normally open (NO)
Effective area〔Cv〕	mm²	5〔0.28〕			
Port size		Rc1/8			
Lubrication		Not required			
Operating pressure range	kPa {mmHg} [in.Hg]	−100～0 {−750.1～0} [−29.53～0]		−100～0 {−750.1～0} [−29.53～0], 0～0.9MPa {0～9.2kgf/cm²} [0～131psi.]	
Proof pressure	MPa {kgf/cm²} [psi.]	—		1.32 {13.5} [191]	
Response timeNote 2	DC24V	20/20 or below			
ON/OFF	AC100V,AC200V	20/20 or below			
Maximum operating frequency	Hz	5			
Maximum temperature range (atmosphere and media)	°C [°F]	0～50 [32～122]			
Shock resistance m/s² {G}	Lateral direction	1373.0 {140.0}			
	Axial direction	392.3 {40.0}			
Mounting direction		Any			
Mass	g [oz.]	190 [6.70]			

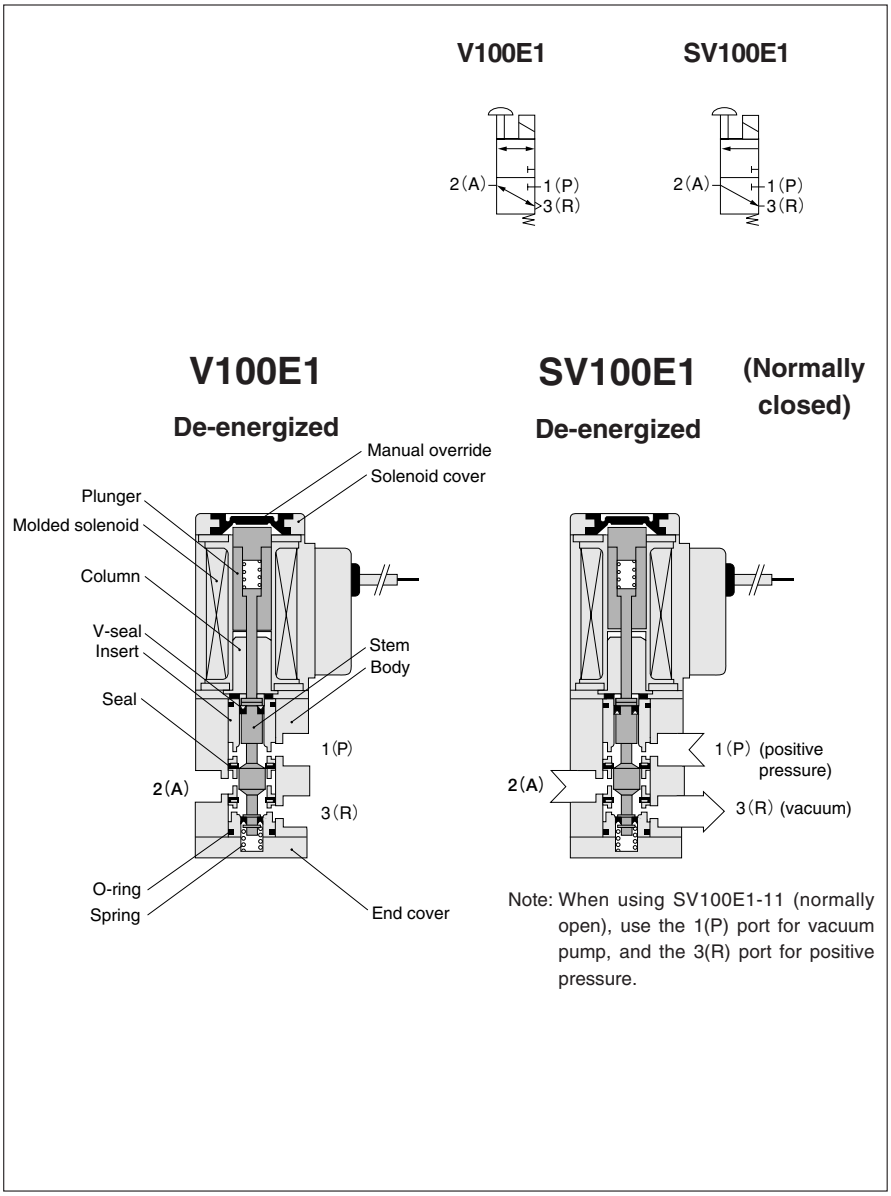
Notes: 1. The positive pressure side is normally closed.
2. For V100E1, values when the vacuum is −100kPa {−750.1mmHg} [−29.53in.Hg]. For SV100E1, values when the air pressure is 0.5MPa {5.1kgf/cm²} [73psi.].

Solenoid Specifications

Item \ Rated voltage		DC24V	AC100V		AC200V	
Type		DC type	Flywheel 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〕	41 〔45〕	39 〔42〕
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			
	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 LED indicators and surge suppression.

Operating Principles and Symbols



Note: When using SV100E1-11 (normally open), use the 1(P) port for vacuum pump, and the 3(R) port for positive pressure.

Valve functions and connection port configurations

V100
When not using positive pressure

		De-energized	Energized
2-port	Normally closed (NC)	2(A) → 1(P) (vacuum pump, etc.), 3(R) (plug)	
	Normally open (NO)	2(A) → 1(P) (plug), 3(R) (vacuum pump, etc.)	
3-port	Normally closed (NC)	2(A) → 1(P) (vacuum pump, etc.), 3(R) (atmosphere)	
	Normally open (NO)	2(A) → 1(P) (atmosphere), 3(R) (vacuum pump, etc.)	
Selector valve		2(A) → 1(P) (vacuum pump, etc.), 3(R) (vacuum pump, etc.)	
Divider valve		(vacuum pump, etc.) 2(A) → 1(P), 3(R)	

SV100
When using both vacuum and positive pressure

3-port	Normally closed (NC)	2(A) → 1(P) (positive pressure), 3(R) (vacuum pump, etc.)	
	Normally open (NO)	2(A) → 1(P) (vacuum pump, etc.), 3(R) (positive pressure)	

Major Parts and Materials

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

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

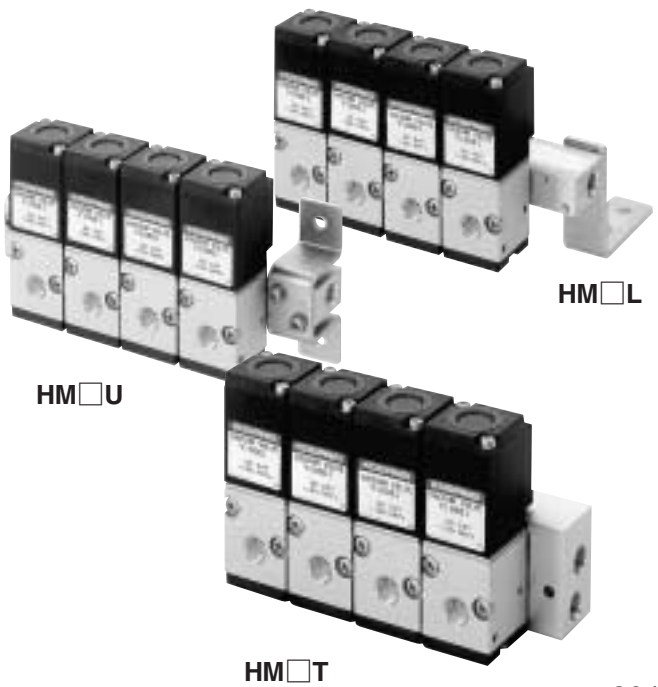
Manifold Connection Port Size

Manifold model	Port	Location of piping connection	Port size
HM□T	1(P)	Manifold	Rc1/8
	2(A)	Valve	
	3(R)	Manifold	
HM□U	1(P)	Manifold	Rc1/8
	2(A)	Valve	
	3(R)	Valve	
HM□L	1(P)	Manifold	Rc1/8
	2(A)	Valve	
	3(R)	Valve	

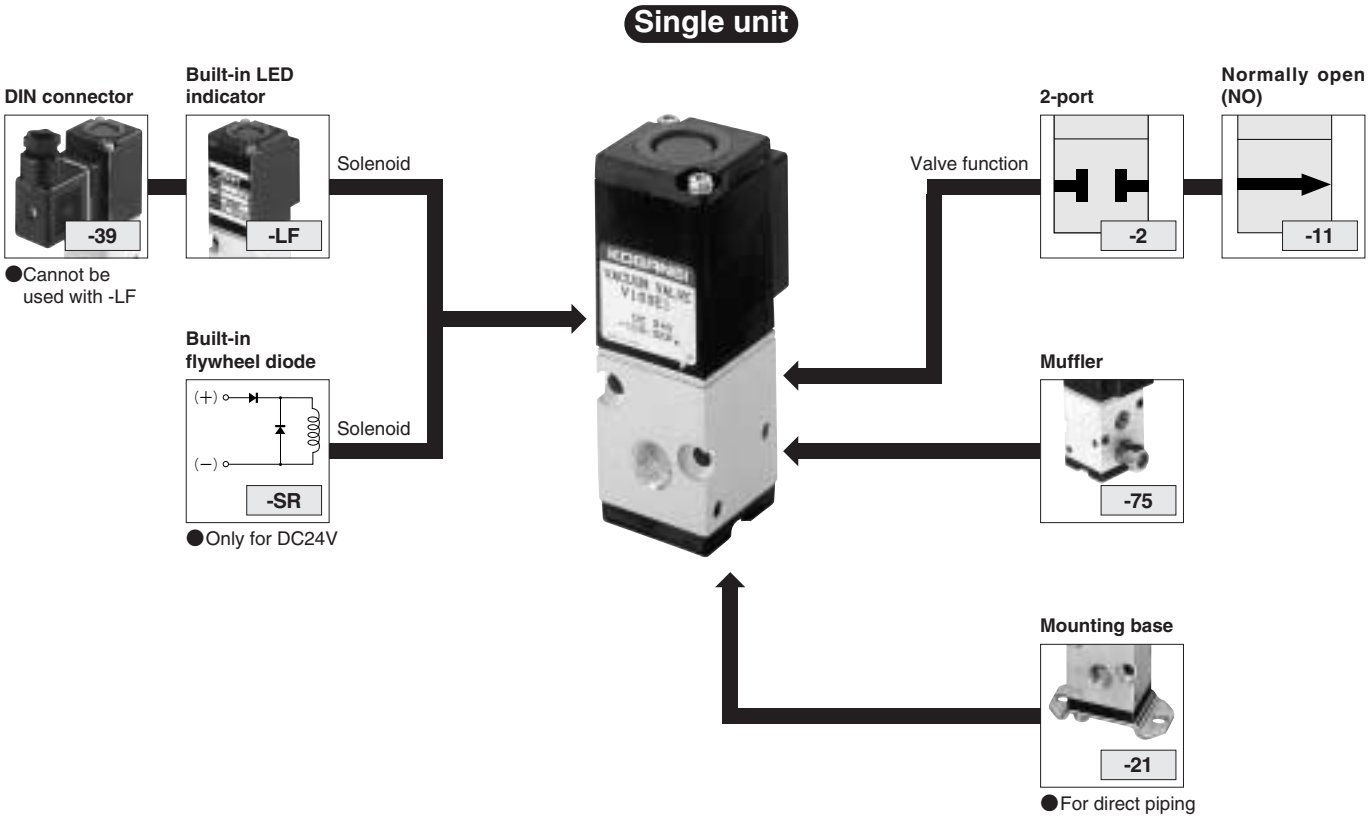
Manifold Mass

g [oz.]

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



Optional System



Solenoid Vacuum Valve Order Codes

For vacuum

		Basic model	Valve function: 2-port, 2-port	Valve function: 2-port, Normally open (NO)	Mounting base	Option: DIN connector	Option: Muffler	Option: LED indicator	Option: Flywheel diode	Voltage
Direct piping	3-port shared with normally open and closed	V100E1			-21	-39	-75	-LF	-SR	DC12V DC24V AC100V AC200V
	2-port normally closed		-2 Note 2							
	2-port normally open		-2 Note 2	-11						
For manifold only Note 1	3-port normally open	MV100E1		-11		-39	-75 Note 3	-LF	-SR	DC12V DC24V AC100V AC200V
	2-port normally open		-2	-11						

Notes: 1. They cannot be used as single units.
2. Plug included.
3. Selection available only for U or L type manifolds.

●Always make a selection.

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

●For DC12V, DC24V only. Standard for AC100V and AC200V.

●Not available for DIN connector

For both vacuum and positive pressure

		Basic model	Valve function: Normally open (NO)	Mounting base	Option: DIN connector	Option: LED indicator	Option: Flywheel diode	Voltage
Direct piping	3-port Note 1 normally closed	SV100E1		-21	-39	-LF	-SR	DC12V DC24V AC100V AC200V
	3-port normally open		-11					
For manifold only Note 2	3-port normally open	MSV100E1	-11		-39	-LF	-SR	DC12V DC24V AC100V AC200V

Notes: 1. The positive pressure side is normally closed.
2. They cannot be used as single units.

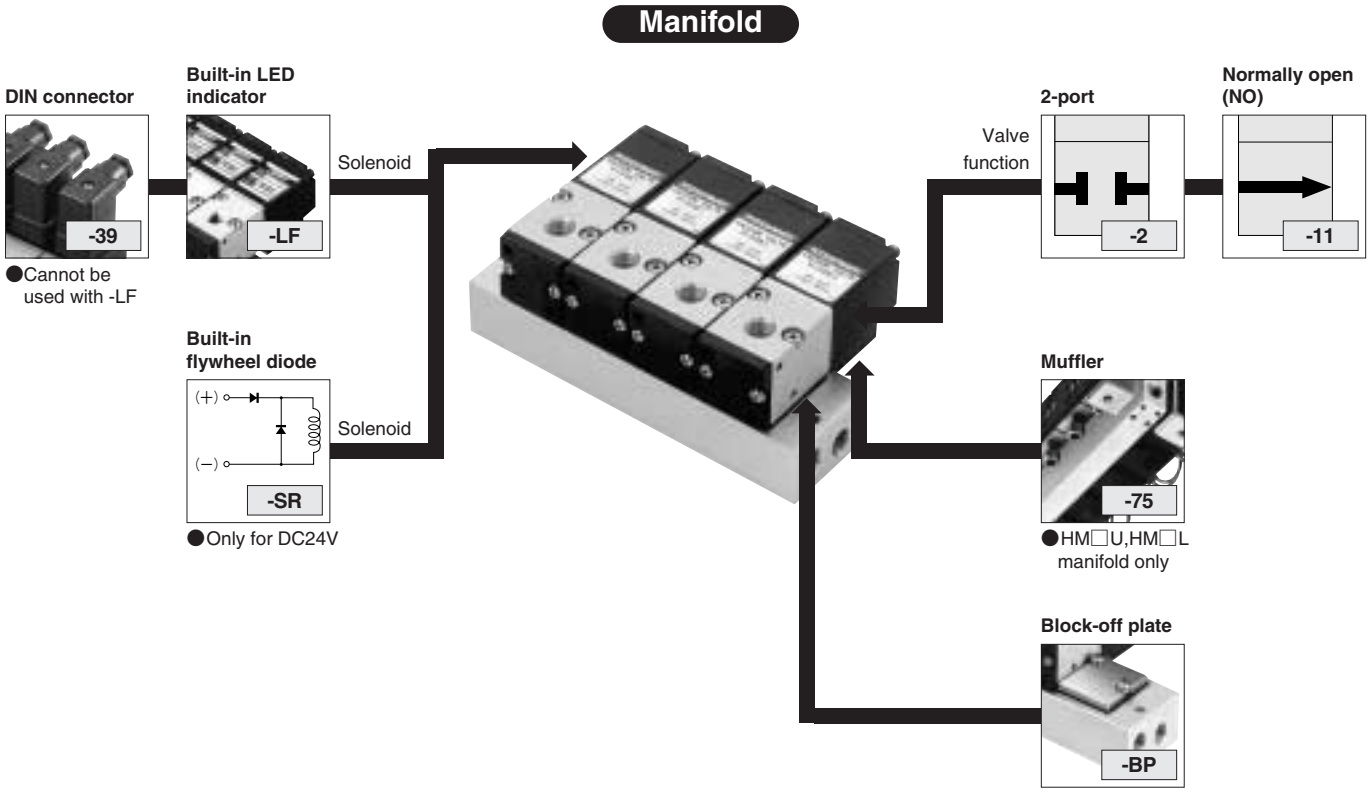
●Always make a selection.

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

●For DC12V, DC24V only. Standard for AC100V and AC200V.

●Not available for DIN connector

Optional System



Manifold Order Codes

For vacuum

Manifold model: Number of units		Station	Valve model: Basic model	Option: 2-port	Option: Normally open (NO)	DIN connector	Muffler	LED indicator	Flywheel diode	Voltage
HM	2 ⋮ 10	T	-V100E1			-39		-LF	-SR	DC12V DC24V AC100V AC200V
		stn.□ ⋮ stn.□		-2						
			-MV100E1		-11					
				-2	-11					
		U L	-V100E1			-39	-75	-LF	-SR	DC12V DC24V AC100V AC200V
		stn.□ ⋮ stn.□		-2						
			-MV100E1		-11		-75			
				-2	-11					

●Valve mounting location from the left-hand side when facing the 2(A) port

●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.

●Always make a selection.

●For DC12V, DC24V only. Standard for AC100V and AC200V.

●Not available for DIN connector

For both vacuum and positive pressure

Manifold model: Number of units		Station	Valve model: Basic model	Option: Normally open (NO)	DIN connector	LED indicator	Flywheel diode	Voltage
HM	2 ⋮ 10	T	-SV100E1 Note		-39	-LF	-SR	DC12V DC24V AC100V AC200V
		stn.□ ⋮ stn.□	-MSV100E1	-11				

Note: The positive pressure side is normally closed.

●Valve mounting location from the left-hand side when facing the 2(A) port

●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.

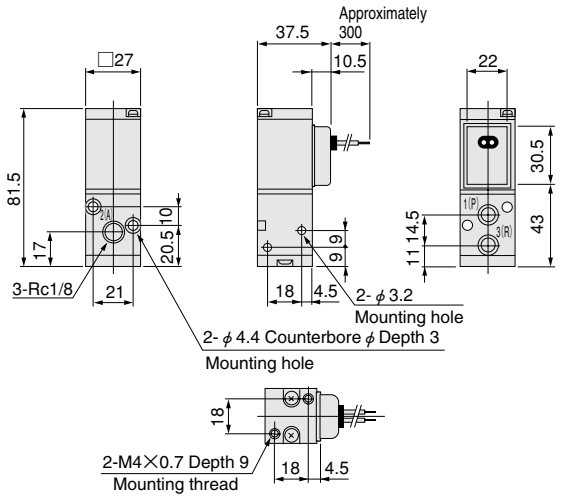
●Always make a selection.

●For DC12V, DC24V only. Standard for AC100V and AC200V.

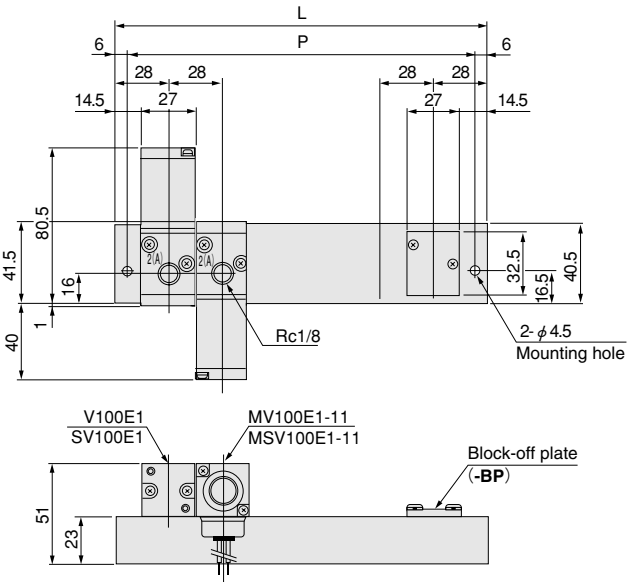
●Not available for DIN connector

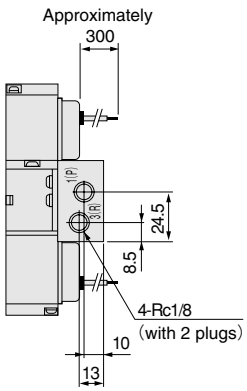
Dimensions (mm)

V100E1
SV100E1



HM□T



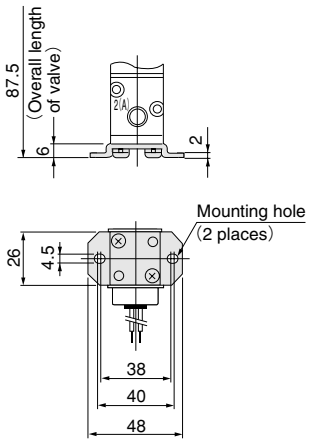


Unit dimensions

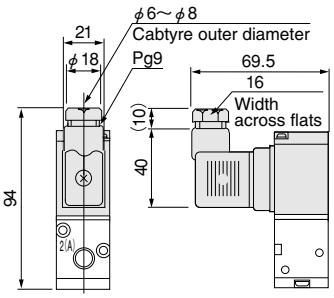
Model	L	P
HM2T	84	72
3T	112	100
4T	140	128
5T	168	156
6T	196	184
7T	224	212
8T	252	240
9T	280	268
10T	308	296

Options

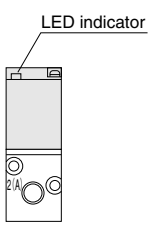
●Mounting base: **-21**



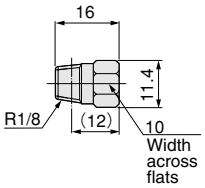
●Solenoid with DIN connector: **-39**



●Solenoid with LED indicator: **-LF**

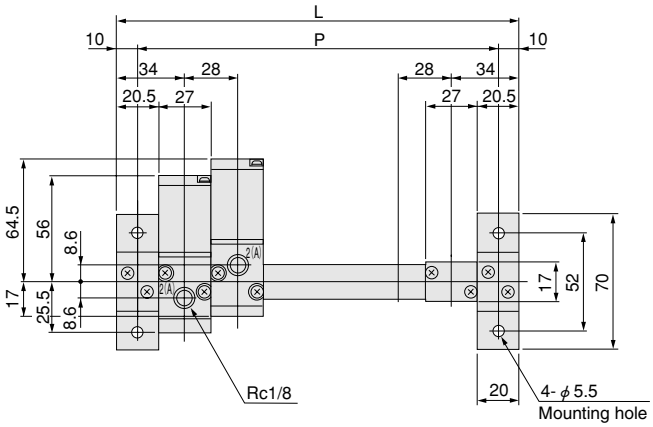


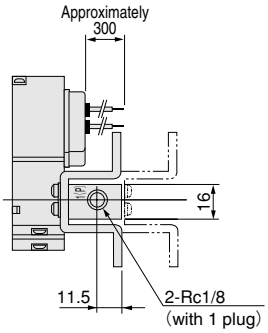
●Muffler: **-75**

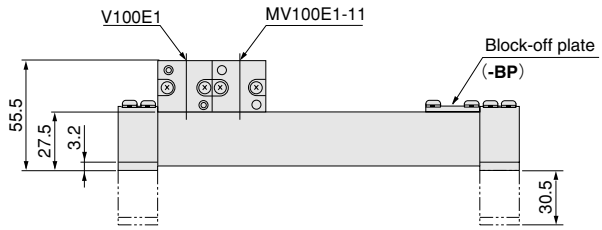


Dimensions (mm)

HM□U



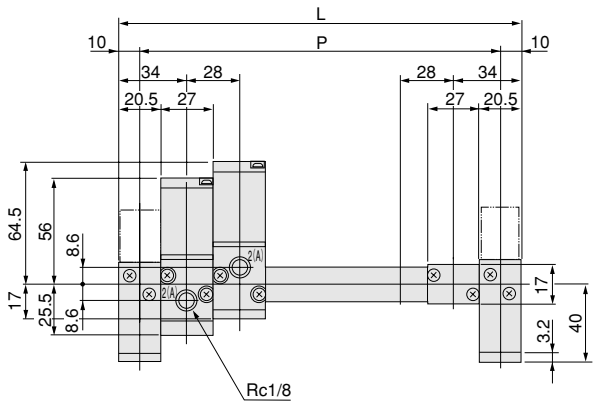


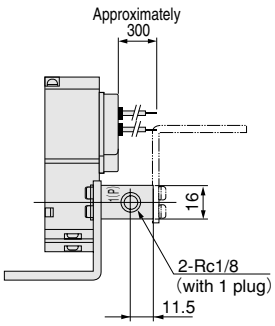


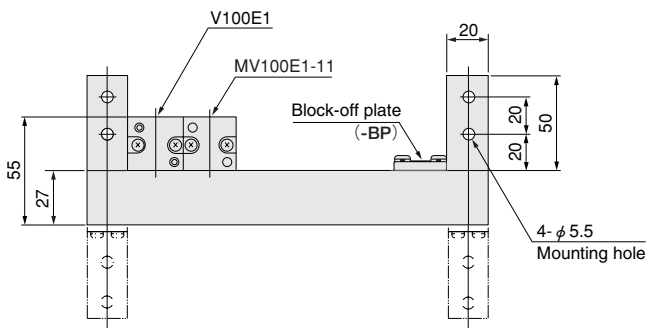
Unit dimensions

Model	L	P
HM2U	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

HM□L







Unit dimensions

Model	L	P
HM2L	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

SQUARE TYPE SOLENOID VACUUM VALVES

V200 Series

Specifications

Item \ Basic model	V200E1	MV200E1-11	SV200E1	MSV200E1-11
Media	Vacuum		Vacuum, air	
Operation type	Direct acting			
Number of positions	2 positions			
Number of ports	2, 3 ports		3 ports	
Valve function	Normally closed (NC) or normally open (NO)	Normally open (NO)	Normally closed (NC)Note 1	Normally open (NO)
Effective area〔Cv〕 mm²	8.5〔0.47〕			
Port size	Rc1/4			
Lubrication	Not required			
Operating pressure range kPa {mmHg} [in.Hg]	−100～0 {−750.1～0} [−29.53～0]		−100～0 {−750.1～0} [−29.53～0], 0～0.9MPa {0～9.2kgf/cm²} [0～131psi.]	
Proof pressure MPa {kgf/cm²} [psi.]	—		1.32 {13.5} [191]	
Response timeNote 2 DC24V	20/20 or below			
ON/OFF AC100V, AC200V	20/20 or below			
Maximum operating frequency Hz	5			
Maximum temperature range (atmosphere and media) °C [°F]	0～50 [32～122]			
Shock resistance m/s² {G} Lateral direction	980.7 {100.0}			
Shock resistance m/s² {G} Axial direction	588.4 {60.0}			
Mounting direction	Any			
Mass g [oz.]	300 [10.58]			

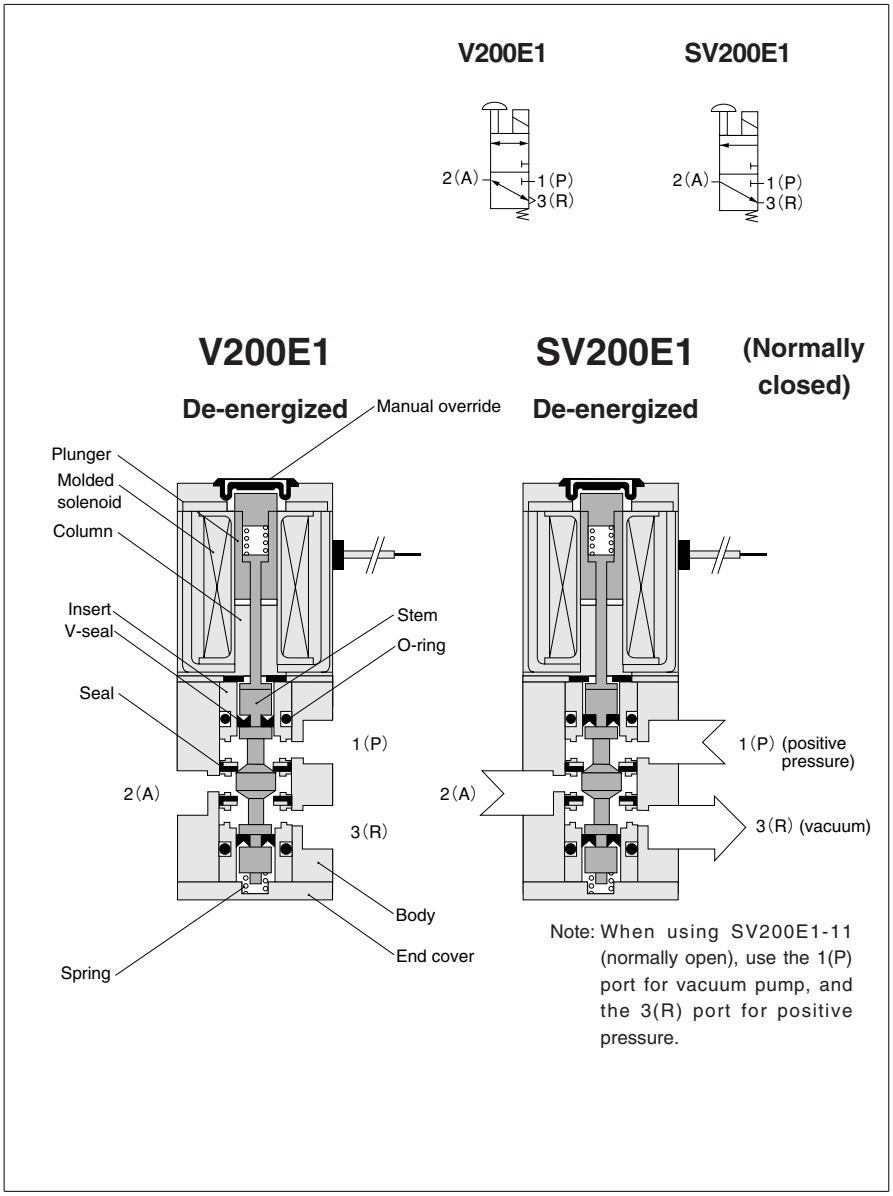
Notes: 1. The positive pressure side is normally closed.
2. For V200E1, values when the vacuum is −100kPa {−750.1mmHg} [−29.53in.Hg]. For SV2001E1, values when the air pressure is 0.5MPa {5.1kgf/cm²} [73psi].

Solenoid Specifications

Item \ Rated voltage	DC24V	AC100V		AC200V	
Type	DC type	Flywheel 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
Current Note 1 (when rated voltage is applied) Energizing Note 2 mA (r.m.s.)	420 (10.1W) 〔432 (10.4W)〕	160 〔170〕	150 〔160〕	70 〔72〕	65 〔68〕
Allowable leakage current mA	30	15		7	
Insulation resistance MΩ	10				
Wiring type and lead wire length Standard	Grommet type: 300mm [11.8in.]				
Wiring type and lead wire length 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			
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 LED indicators and surge suppression.

Operating Principles and Symbols



Note: When using SV200E1-11 (normally open), use the 1(P) port for vacuum pump, and the 3(R) port for positive pressure.

Valve functions and connection port configurations

V200

When not using positive pressure

		De-energized	Energized
2-port	Normally closed (NC)	2(A) → 1(P) (vacuum pump, etc.), 3(R) (plug)	
	Normally open (NO)	2(A) → 1(P) (plug), 3(R) (vacuum pump, etc.)	
3-port	Normally closed (NC)	2(A) → 1(P) (vacuum pump, etc.), 3(R) (atmosphere)	
	Normally open (NO)	2(A) → 1(P) (atmosphere), 3(R) (vacuum pump, etc.)	
Selector valve		2(A) → 1(P) (vacuum pump, etc.), 3(R) (vacuum pump, etc.)	
Divider valve		(vacuum pump, etc.) 2(A) → 1(P), 3(R)	

SV200

When using both vacuum and positive pressure

3-port	Normally closed (NC)	2(A) → 1(P) (positive pressure), 3(R) (vacuum pump, etc.)	
	Normally open (NO)	2(A) → 1(P) (vacuum pump, etc.), 3(R) (positive pressure)	

Major Parts and Materials

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

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

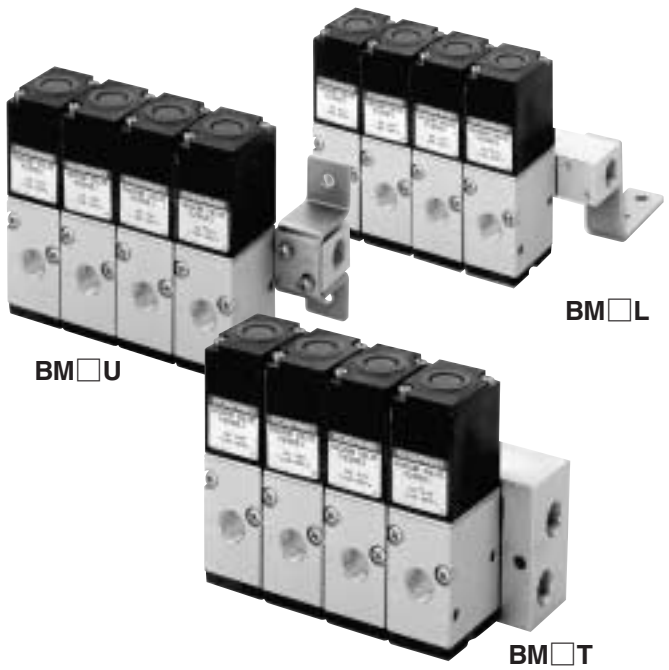
Manifold Connection Port Size

Manifold model	Port	Location of piping connection	Port size
BM□T	1(P)	Manifold	Rc1/4
	2(A)	Valve	
	3(R)	Manifold	
BM□U	1(P)	Manifold	Rc1/4
	2(A)	Valve	
	3(R)	Valve	
BM□L	1(P)	Manifold	Rc1/4
	2(A)	Valve	
	3(R)	Valve	

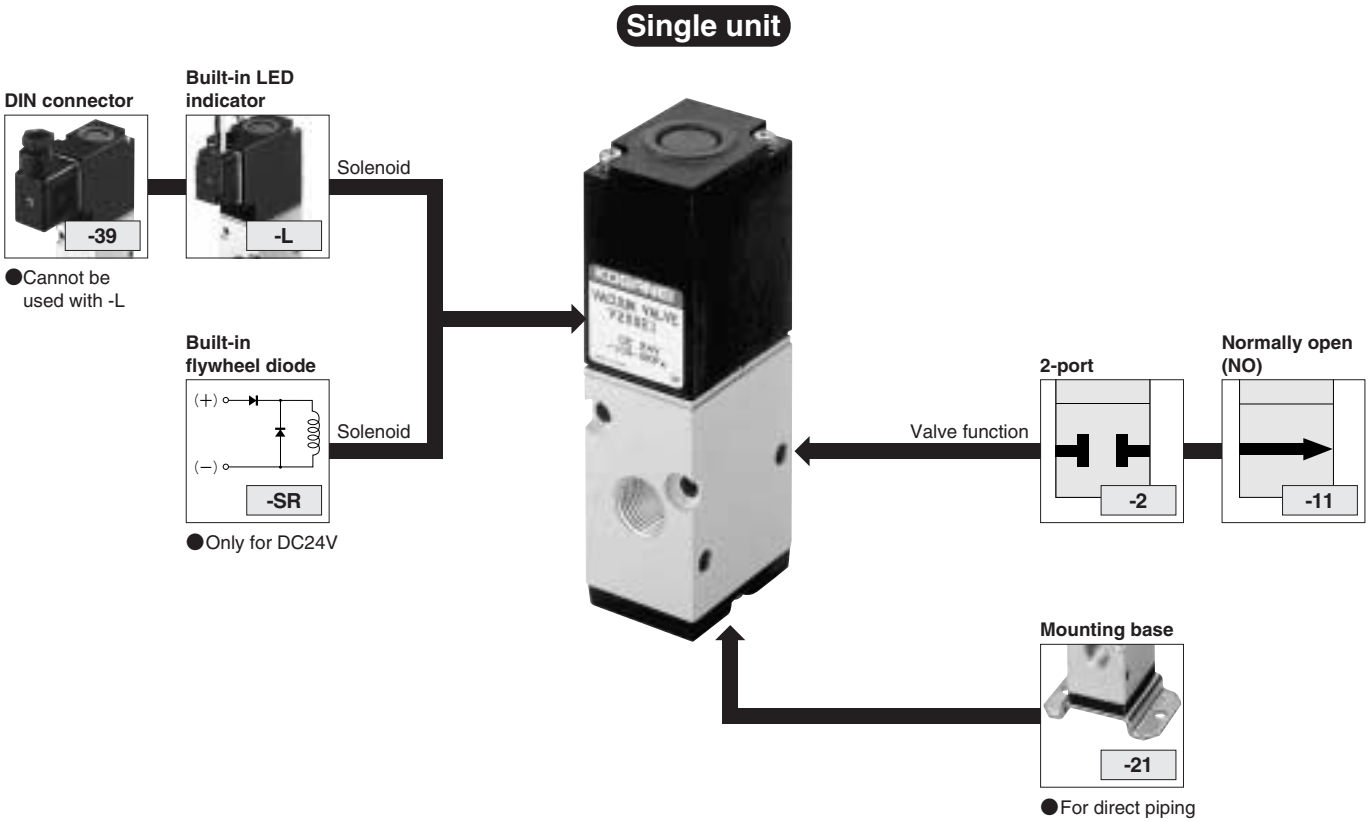
Manifold Mass

g [oz.]

Manifold model	Mass calculation of each unit (n=number of units)	Block-off plate
BM□T	(138×n)+125 [(4.87×n)+4.41]	30 [1.06]
BM□U	(50×n)+200 [(1.76×n)+7.05]	15 [0.53]
BM□L	(50×n)+200 [(1.76×n)+7.05]	15 [0.53]



Optional System



Solenoid Vacuum Valve Order Codes

For vacuum

		Basic model	Valve function: 2-port	Valve function: Normally open (NO)	Option: Mounting base	DIN connector	LED indicator	Flywheel diode	Voltage
Direct piping	3-port normally closed	V200E1			-21	-39	-L	-SR	DC24V AC100V AC200V
	2-port normally closed		-2 Note 2						
	2-port normally open		-2	-11					
For manifold only Note 1	3-port normally open	MV200E1		-11		-39	-L	-SR	DC24V AC100V AC200V
	2-port normally open		-2	-11					

Notes: 1. They cannot be used as single units.
2. Plug included.

- When ordering the non-ion specification, enter **-NCU** after the basic model code.
- Always make a selection.
- For DC24V only. Standard for AC100V and AV200V.
- Not available for DIN connector

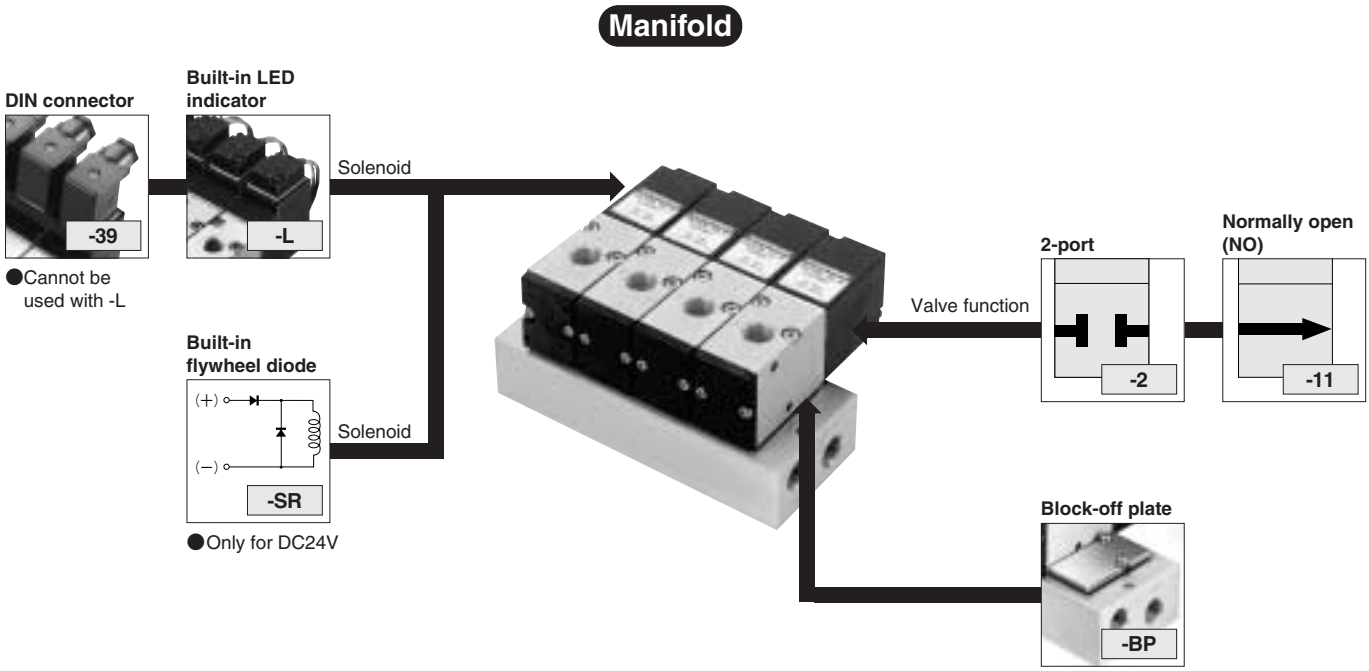
For both vacuum and positive pressure

		Basic model	Valve function: Normally open (NO)	Option: Mounting base	DIN connector	LED indicator	Flywheel diode	Voltage
Direct piping	3-port Note 1 normally closed	SV200E1		-21	-39	-L	-SR	DC24V AC100V AC200V
	3-port normally open		-11					
For manifold only Note 2	3-port normally open	MSV200E1	-11		-39	-L	-SR	DC24V AC100V AC200V

Notes: 1. The positive pressure side is normally closed.
2. They cannot be used as single units.

- When ordering the non-ion specification, enter **-NCU** after the basic model code.
- Always make a selection.
- For DC24V only. Standard for AC100V and AV200V.
- Not available for DIN connector

Optional System



Manifold Order Codes

For vacuum

Manifold model: Number of units			Station	Valve model: Basic model	2-port	Normally open (NO)	Option: DIN connector	LED indicator	Flywheel diode	Voltage
BM	2 ⋮ 10	T U L	stn.□ ⋮ stn.□	-V200E1			-39	-L	-SR	DC24V AC100V AC200V
					-2					
				-MV200E1		-11				
					-2	-11				

●Valve mounting location from the left-hand side when facing the 2(A) port

●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.

●Always make a selection.

●Not available for DIN connector

●For DC24V only. Standard for AC100V and AV200V.

For both vacuum and positive pressure

Manifold model: Number of units			Station	Valve model: Basic model	Normally open (NO)	Option: DIN connector	LED indicator	Flywheel diode	Voltage
BM	2 ⋮ 10	T	stn.□ ⋮ stn.□	-SV200E1		-39	-L	-SR	DC24V AC100V AC200V
				-MSV200E1	-11				

Note: The positive pressure side is normally closed.

●Valve mounting location from the left-hand side when facing the 2(A) port

●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.

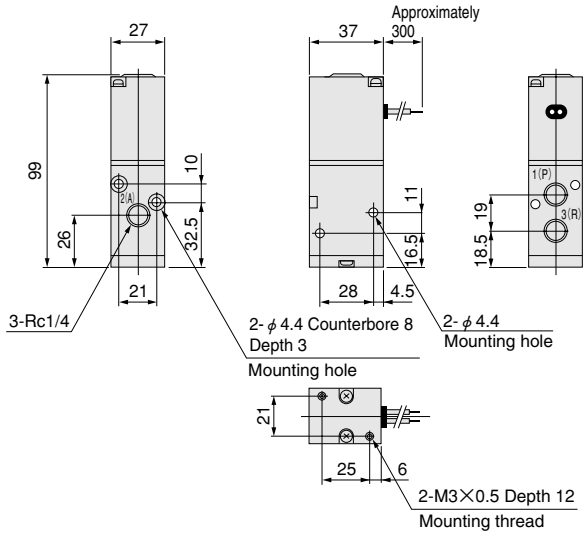
●Always make a selection.

●Not available for DIN connector

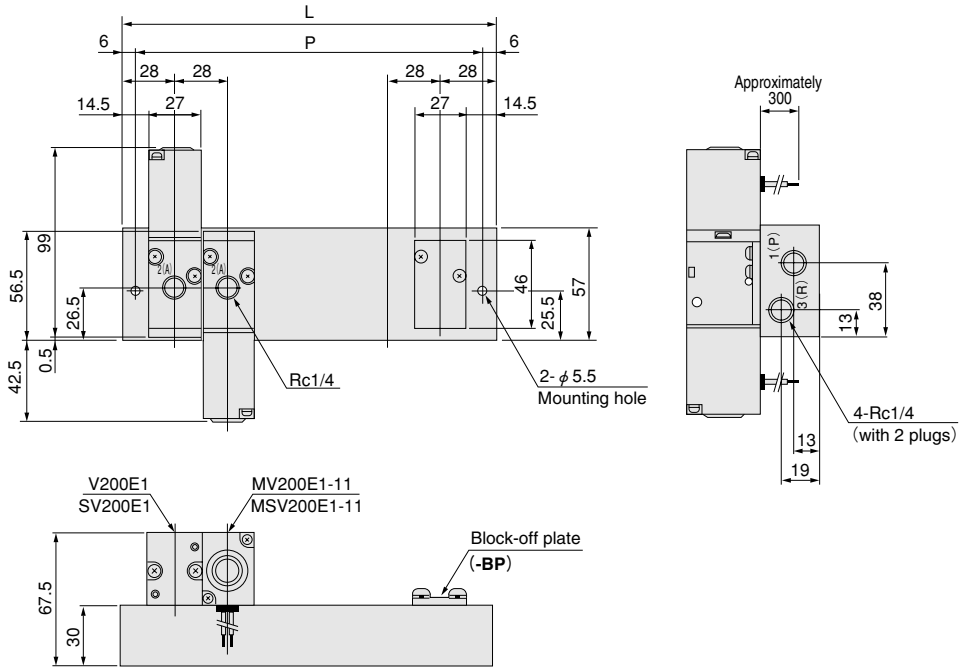
●For DC24V only. Standard for AC100V and AV200V.

Dimensions (mm)

V200E1
SV200E1



BM□T

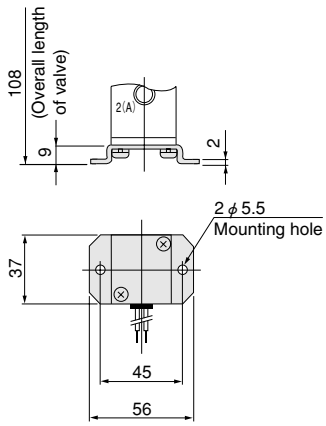


Unit dimensions

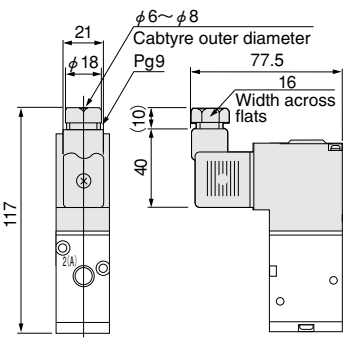
Model	L	P
BM2T	84	72
3T	112	100
4T	140	128
5T	168	156
6T	196	184
7T	224	212
8T	252	240
9T	280	268
10T	308	296

Options

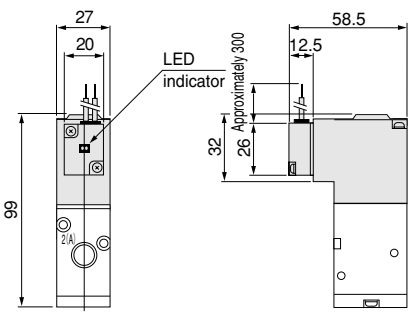
●Mounting base: **-21**



●Solenoid with DIN connector: **-39**

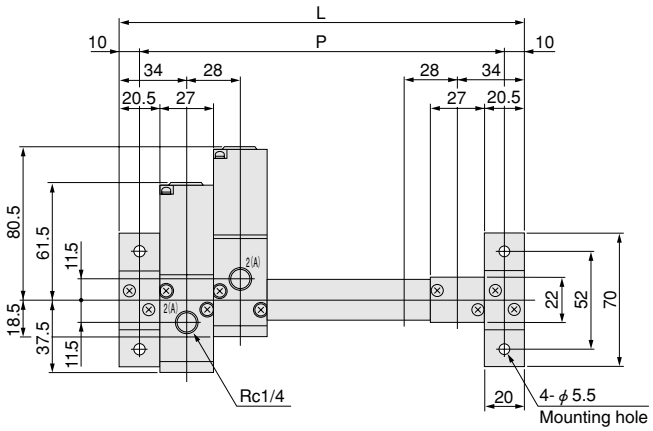


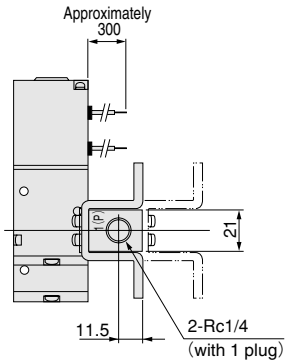
●Solenoid with LED indicator: **-L**

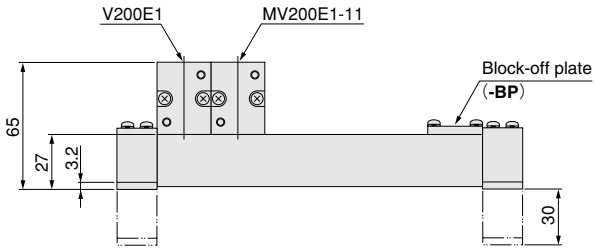


Dimensions (mm)

BM□U



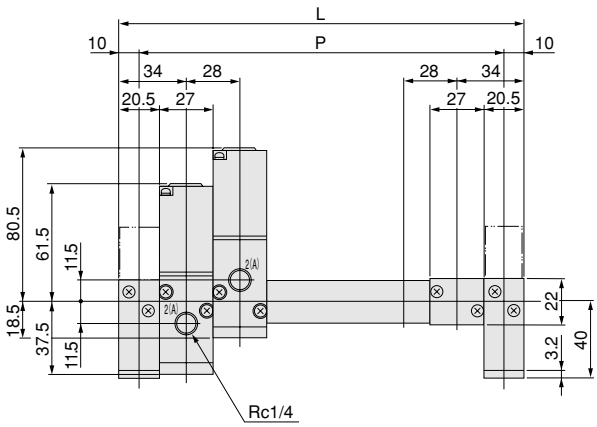


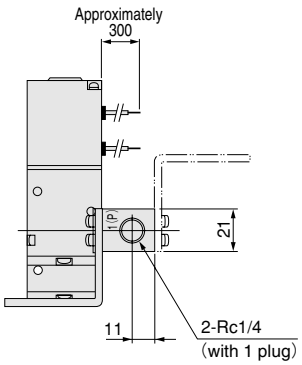


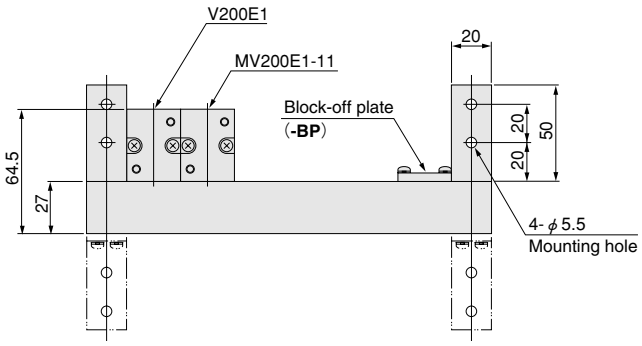
Unit dimensions

Model	L	P
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

BM□L







Unit dimensions

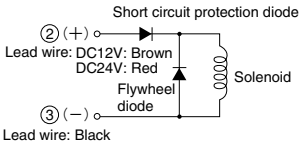
Model	L	P
BM2L	96	76
3L	124	104
4L	152	132
5L	180	160
6L	208	188
7L	236	216
8L	264	244
9L	292	272
10L	320	300

Solenoid

Internal circuit

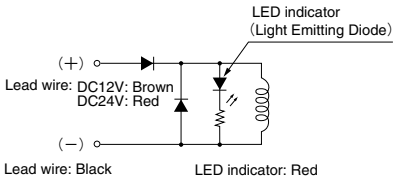
●DC12V, DC24V

Standard solenoid (Surge suppression)



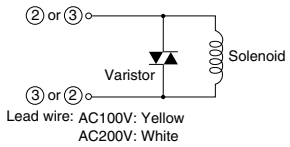
② and ③ are for with DIN connector (Order code: **-39**).

Solenoid with LED indicator (Surge suppression) Order code: -PSL, -PLL



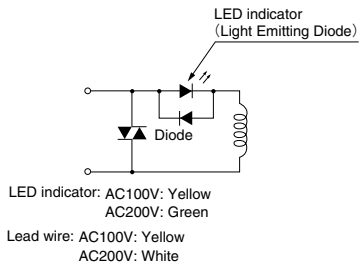
●AC100V, AC200V

Standard solenoid (Surge suppression)



② and ③ are for with DIN connector (Order code: **-39**).

Solenoid with LED indicator (Surge suppression) Order code: -PSL, -PLL

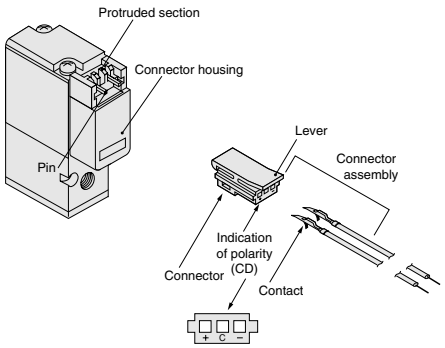


Cautions:
1. Do not apply megger between the lead wires.
2. The DC12V and DC24V solenoids will not short circuit even if the wrong polarity is applied, but the valve will not operate.
3. Leakage current inside the circuit could result in failure of the solenoid valve to return, or in other erratic operation. Always use it within the range of the allowable leakage current. When circuit conditions, etc. cause the leakage current to exceed the allowable leakage current, consult us.

Plug connector

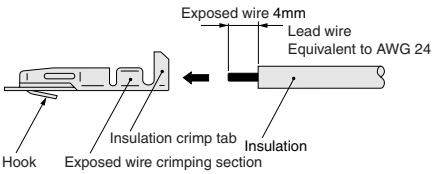
Attaching and removing plug connector

Use fingers to insert the connector into the pin, push it in until the lever claw latches onto the protruded section of the connector housing, and complete the connection.
To remove the connector, squeeze the lever along with the connector, lift the lever claw up from the protruded section of the connector housing, and pull it out.



Crimping of connecting lead wire and contact

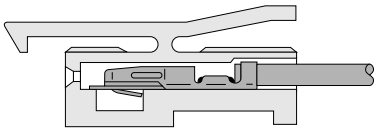
To crimp lead wires into contacts, strip off 4mm [0.16in.] of the insulation from the end of the lead wire, insert it into the contact, and crimp it. Be sure to avoid catching the insulation on the exposed wire crimping section.



Cautions:
1. Do not pull hard on the lead wire.
2. For crimping of connecting lead wire and contact, always use a dedicated crimping tool.
   Contact: Model 702062-2M
   Manufactured by Sumiko Tech, Inc.
   Crimping tool: Model F1-702062
   Manufactured by Sumiko Tech, Inc.

Attaching and removing contact and connector

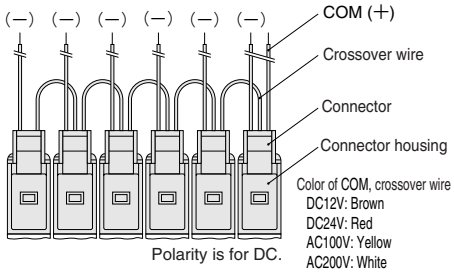
Insert the contact with lead wire into a plug connector □ hole until the contact hook latches on the connector and is secured to the plug connector. Confirm that the lead wire cannot be easily pulled out.
To remove it, insert a tool with a fine tip (such as a small screwdriver) into the rectangular hole on the side of the plug connector to push up on the hook, and then pull out the lead wire.



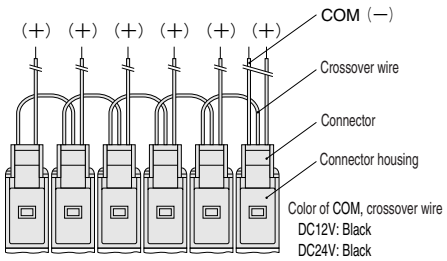
Cautions:
1. Do not pull hard on the lead wire. It could result in defective contacts, breaking wires, etc.
2. When the pin is bent, use a small screwdriver, etc. to gently straighten out the pin, and then complete the connection to the plug connector.

Common terminal pre-wired plug connector

1.Pre-wired common terminal at DC positive side or AC.
Order code With straight connector: -CPSL
With L connector: -CPLL



2.Pre-wired common terminal at DC negative side
Order code With straight connector: -CMSL
With L connector: -CMLL

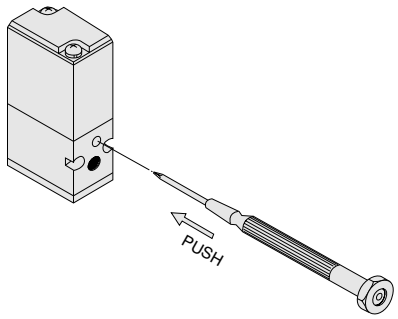


Cautions:
1. The diagrams show a straight connector configuration.
   While the connector's orientation is different in the case of the L connector, in every case the COM lead wire comes from the last station's mounted valve.
2. Since the COM terminal is connected to a crossover terminal inside the connector housing, the connector cannot be switched between a positive common and a negative common by changing the connectors.

Manual override

Non-locking type, locking protruding type

For the non-locking type manual override, use an object with a fine tip to push the manual override down all the way. The 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.
To lock the locking protruding type manual override, use a finger tip or a small screwdriver to push down on the manual override all the way and turn it 45 degrees. Either turning direction at this time is acceptable. When locked, turning the manual override from the locking position releases a spring on the manual override, returns it to its normal position, and releases the lock. When the manual override is not turned, this type acts just like the non-locking type. The valve works the same as in an energized state as long as the manual override is pushed down, and returns to the normal position upon release.



Caution: Always release the lock of the locking protruding type manual override before commencing normal operations.

Manifold

Piping

The 1(P) port and 3(R) port are located on both end surfaces of the manifold, and the mounting location determines selection of piping direction. At shipping, ports on one side are plugged. Remove them, and then use sealing tape or other sealing agent, and then tighten .

Block-off plate

To close the unused stations, use a block-off plate (Order code: **-BP**).

Caution: For the 1(P) port piping, use a size that matches the manifold's piping connection port. Insufficient flow rate or vacuum could result in defective valve operation or in insufficient picking capacity with the vacuum pad.

General precautions

Mounting

1. While any mounting direction is acceptable, using the mounting base (Order Code: **030-21**) for installation, make sure to avoid applying strong shocks in the lateral direction.
2. When using in locations subject to dripping water or oil, or in extremely dusty locations, use a cover, etc. to protect the unit. In addition, install a muffler (Order Code: **KM-06**), etc. to the 3(R) port to prevent dust from entering the unit.
3. Before piping with valves, always thoroughly blow off foreign materials (blow by compressed air) in the piping interior. Entering machining chips or sealing tape, rust, etc., generated during plumbing could result in air leaks and other defective operations.
4. When mounting a valve unit inside the control panels or when the operation requires long energizing periods, provide heat radiation measures.

Media

Use air for the media. For use of any other media, consult us.

Atmosphere

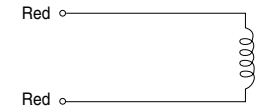
Cannot be used when the substances listed below are found in the media and atmosphere.
Organic solvents, phosphate ester type hydraulic oil, sulphur dioxide, chlorine gas, or other acids, etc.

Solenoid

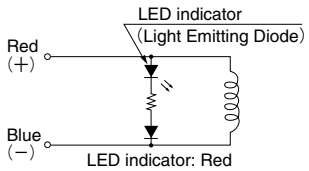
Internal circuit

●DC24V

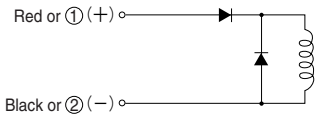
Standard solenoid



Solenoid with LED indicator
Order code: -LF,-L

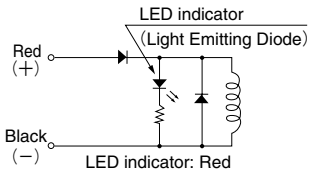


Solenoid with surge suppression
Order code: -SR

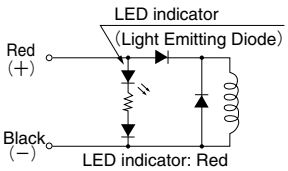


① and ② are for with DIN connector (Order code: **-39**).

Solenoid with LED indicator and surge suppression
Order code: -LF-SR
(V050 standard type, V100 and SV100 series)

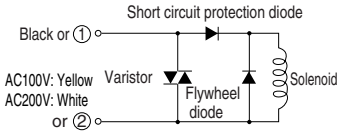


Solenoid with LED indicator and surge suppression
Order code: -L-SR
(V050 low current type, V200 and SV200 series)



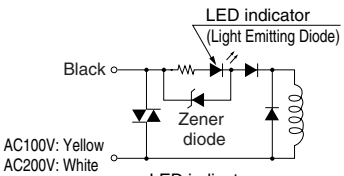
●100V, AC200V
(Surge suppression)

Standard solenoid



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

Solenoid with LED indicator
Order code: -LF,-L



Cautions:
1. Do not apply megger between the lead wires.
2. The DC24V solenoid will not short circuit even if the wrong polarity is applied, but the valve with surge-suppression will not operate. Also, the LED indicator will not turn on, for units with LED indicators.
3. Leakage current inside the circuit could result in failure of the solenoid valve to return, or in other erratic operation. Always use within the range of the allowable leakage current. When circuit conditions, etc. cause the leakage current to exceed the allowable leakage current, consult us.
4. Since the AC solenoid uses a diode for the solenoid, always connect lead wires of the same color when wiring a number of solenoid valves in parallel. The DC24V standard solenoid, however, has no polarity, so any lead wire connection is acceptable.

Manifold

Piping

The 1(P) port and 3(R) port are located at both end surfaces of the manifold, and the mounting location determines selection of piping direction.
At shipping, ports on one side are plugged. Remove them, and then use sealing tape or other sealing agent, and then tighten.

Block-off plate

To close the unused stations, use a block-off plate (Order code: **-BP**).

Cautions:
1. For the 1(P) port piping, use a size that matches the manifold's piping connection port.
2. When installing piping or mufflers to the 3(R) port, ensure there will be minimum exhaust resistance.
3. When multiple number of valves are operated simultaneously on a multi-units manifold, or when used at high frequency, use the 1(P) and 3(R) ports on both end surfaces.

General precautions

Mounting

1. While any mounting direction is acceptable, for installation using the mounting base (Order Code: **-21**), make sure to avoid applying strong shocks in the lateral direction.
2. When using in locations subject to dripping water or oil, or in extremely dusty locations, use a cover, etc. to protect the unit. In addition, install a muffler, etc. to the exhaust port to prevent dust from entering the unit.
3. Before piping with valves, always thoroughly blow off foreign materials (blow by compressed air) in the piping interior. Entering machining chips or sealing tape, rust, etc., generated during plumbing could result in air leaks and other defective operations.
4. When mounting a valve unit inside the control panels or when the operation requires long energizing periods, provide heat radiation measures.

Piping

In the V050, SV100, and SV200 series, the flow direction is limited. See p.854 for the valve functions and piping port configurations, then make the piping.

Media

1. Use air for the media. For use of any other media, consult us.
2. Air used for the valve should be clean air that contains no deteriorated compressor oil, etc. Install an air filter (filtration of 40μm or less) near the valve to remove collected liquid or dust. In addition, drain the air filter periodically.

Lubrication

While the unit can be used without lubrication, the Turbine Oil Class 1 (ISO VG32) or equivalent is recommended when using dry air (air that contains no moisture or oil content).
Avoid using spindle oil or machine oil.

Atmosphere

Cannot be used when the substances listed below are found in the media and atmosphere.
Organic solvents, phosphate ester type hydraulic oil, sulphur dioxide, chlorine gas, or other acids, etc.

Before selecting and using products, please read all the Safety Precautions carefully to ensure proper product use.
The Safety Precautions shown below are to help you use the product safely and correctly, and to prevent injury or damage to assets beforehand.
Follow the Safety Precautions for: ISO4414 (Pneumatic fluid power—Recommendations for the application of equipment to transmission and control systems), JIS B 8370 (Pneumatic system regulations)

The directions are ranked according to degree of potential danger or damage: "DANGER!" "WARNING!" "CAUTION!" and "ATTENTION!"

⚠ **DANGER**	Expresses situations that can be clearly predicted as dangerous. If the noted danger is not avoided, it could result in death or serious injury. It could also result in damage or destruction of assets.
⚠ **WARNING**	Expresses situations that, while not immediately dangerous, could become dangerous. If the noted danger is not avoided, it could result in death or serious injury. It could also result in damage or destruction of assets.
⚠ **CAUTION**	Expresses situations that, while not immediately dangerous, could become dangerous. If the noted danger is not avoided, it could result in light or semi-serious injury. It could also result in damage or destruction of assets.
⚠ **ATTENTION**	While there is little chance of injury, this content refers to points that should be observed for appropriate use of the product.

■ This product was designed and manufactured as parts for use in General Industrial Machinery.

■ In the selection and handling of equipment, the system designer or other person with fully adequate knowledge and experience should always read the Safety Precautions, Catalog, User's Manual and other literature before commencing operation. Making mistakes in handling is dangerous.

■ After reading the Instruction Manual, Catalog, etc., always place it where it can be easily available for reference to users of this product.

■ If transferring or lending the product to another person, always attach the Instruction Manual, Catalog, etc., to the product where it is easily visible, to ensure that the new user can use the product safely and properly.

■ The danger, warning, and caution items listed under these "Safety Precautions" do not cover all possible cases. Read the catalog and user's manual carefully, and always keep safety first.

⚠ DANGER

● Do not use for the purposes listed below:
1. Medical equipment related to maintenance or management of human lives or bodies.
2. Mechanical devices or equipment designed for the purpose of moving or transporting people.
3. Critical safety components in mechanical devices.

This product has not been planned or designed for purposes that require advanced stages of safety. It could cause injury to human life.

● Do not use in locations with or near dangerous substances such as flammable or ignitable substances. This product is not explosion-proof. It could ignite or burst into flames.

● When attaching the product and workpiece, always ensure that it is securely mounted in place. Dropping or falling the product or improper operation could result in injury.

● Persons who use a pacemaker, etc., should keep a distance of at least one meter [3.28ft.] away from the product. There is a possibility that the pacemaker will malfunction due to the strong magnet built into the product.

● Never attempt to remodel the product. It could result in abnormal operation leading to injury, electric shock, fire, etc.

● Never attempt inappropriate disassembly, assembly or repair of the product's basic construction, or of its performance or functions. It could result in injury, electric shock, fire, etc.

● Do not splash water on the product. Spraying it with water, washing it, or using it underwater could result in malfunction of the product leading to injury, electric shock, fire, etc.

● While the product is in operation, avoid touching it with your hands or otherwise approaching too close. In addition, do not make any adjustments to the interior or to the attached mechanisms (manual override, connecting and disconnecting of wiring connectors, adjustment of pressure switches, or release or connection of piping tubes or plugs) while in operation. The actuator can move suddenly, possibly resulting in injury.

⚠ WARNING

● Do not use the product in excess of its specification range. Such use could result in product breakdowns, function stop or damage or drastically reduce the operating life.

● Before supplying air or electricity to the device and before starting operation, always conduct a safety check of the area of machine operation. Unintentional supply of air or electricity could possibly result in electric shocks, or in injury caused by contact with moving portion.

● Do not touch the terminal and the miscellaneous switches, etc., while the device is power on. There is a possibility of electric shock and abnormal operation.

● Do not allow the product to be thrown into fire. The product could explode and/or release toxic gases.

● Do not sit on the product, place your foot on it, or place other objects on it. Accidents such as falling and tripping over could result in injury. Dropping the product may result in injury, or also damage or break the product resulting in abnormal or erratic operation, or runaway etc.

● When conducting any kind of operation for the product, such as maintenance, inspection, repair, or connect/disconnect or replacement of piping, always turn off the air supply completely and confirm that residual pressure inside the product or in piping connected to the product is zero before proceeding. In particular, be aware that residual air will still be in the air compressor or air storage tank. The actuator could abruptly move if residual air pressure remains inside the piping, causing injury.

● Before commencing normal operation, always release the lock on the locking type manual override, and confirm that the manual override is in the normal position and that the main valve is in the proper switching position, and only then commence the operation. Failure to do so could lead to erroneous operation.

● Always shut off power when performing wiring operations. Leaving the power on could result in electric shocks.

● Apply the specified voltage for the solenoid. Using the wrong voltage level will prevent the solenoid from performing its function, and could lead to breakage or burn damage of the product itself.

● Avoid scratching the cords for the sensor switch lead wires, etc. Letting the cords be subject to scratching, excessive

bending, pulling, rolling up, or being placed under heavy objects or squeezed between two objects, may result in current leaks or defective transmission that lead to fires, electric shocks, or abnormal operation.

- Do not pull out the connectors while the power is ON. Also, do not put unnecessary stress on the connector. It could result in erroneous equipment operation that could lead to personal injury, equipment breakdown, or electrical shocks, etc.
- Always check the Catalog to ensure that the product wiring and piping is done correctly. Errors in wiring and piping could lead to abnormal operation of the actuators, etc.
- In the first operation after the equipment has been idle for 48 hours or more, or has been in storage, there is a possibility that contacting parts have been sticked, resulting in equipment operation delays or sudden movements. For these first operations, always run a test operation before use to check that operating performance is normal.
- In low frequency use (more than 30 days between uses), there is a possibility that contact parts will stick, resulting in equipment operation delays or sudden movements that could lead to personal injury. Run a test operation at least once every 30 days to confirm that movement is normal.
- For double solenoid type (excluding the Tandem 3-port valve), do not apply current through both solenoids simultaneously. It is impossible in such a situation to maintain the correct valve position, and the equipment may operate in an unintended direction, leading to the possibility of equipment breakdown or personal injury.
- Do not use the solenoid valves or the wiring that controls them, near power lines where large electrical currents are flowing, or in locations subject to powerful magnetic fields or power surges. Such application could lead to unintended operation.
- The solenoid valve can generate surge voltage and electromagnetic waves when the switch is turned off, affecting the operations of surrounding equipment. Use solenoids with surge suppression, or take countermeasures in the electrical circuits for surges or electromagnetic waves.
- Do not use where ozone may be generated, such as near ocean beaches or other places subject to direct sunlight or mercury lamps. Ozone can cause rubber parts to deteriorate, which can lead to degraded performance and functions, or to equipment stoppages and functional shutdown. (Excludes items where measures against ozone have been taken.)
- Do not use any media other than shown on the specifications. Use of non-specified media could lead to functional shutdown after a short period, to sudden performance drops, or to shorter operating life.
- If mounting the solenoid valve inside a control panel, or if energizing it for long periods, provide heat radiation measures to ensure that temperatures surrounding the solenoid valve always remain within the specified temperature range. If energizing the unit for long periods, consult us.
- After finishing wiring operations, always check to ensure that no wiring connection errors exist before turning on the power.
- Do not collect the exhaust lines for air cylinders, etc. with pilot exhaust lines for solenoid valves into the same piping, etc. Interference in the exhaust could result in erratic operation.

⚠ CAUTION

- When mounting the product, leave room for adequate working space around it. Failure to ensure adequate working space will make it more difficult to conduct daily inspections or maintenance, which could eventually lead to system shutdown or damage to the product.
- For mounting or transport of heavy products, use a lift, supporting tool, or several people, to provide firm support, and proceed with due caution to ensure personal safety.
- Do not bring floppy disks or magnetic media, etc., within one meter [3.28ft.] of the product. There is the possibility that the data on the floppy disks will be destroyed due to the magnetism of the magnet.
- If leakage current is occurring in the control circuit, there is a possibility of the product performing an unintended operation. Take measures against current leaking in the control circuit, to ensure that the leakage current value does not exceed the allowed range in the product specifications.
- Do not block the product's breathing holes. Pressure changes occur due to changes in volume during operation. Blocking the breathing holes destroys the pressure balance, and could cause failure of the intentioned operation, equipment damage, or personal injury.
- Do not use the solenoid valve in locations subject to large electrical currents or magnetic fields. It could result in erratic operation.
- Oily materials from the compressor (excluding the oil-free compressor) can cause drastic deterioration in product performance, and even a functional shutdown. Always install a mist filter before pneumatic equipment to remove the oily component.
- The properties of the lubrication oil can change when used in dry air where dew point temperatures is lower than –20 degrees Celsius [–4°F]. It could result in degraded performance or in functional shutdown.
- Do not use the product in locations of direct sunlight (ultraviolet), in locations subject to dust, salt, or iron powder, in locations with humidity and high temperature, or in the media and/or the ambient atmospheres that include organic solvents, phosphoric ester type hydraulic oil, sulfur dioxide, chlorine gas, or acids, etc. These conditions could lead to functional shutdowns, sudden degraded performance, or shortened operating life in a brief period of time. For materials used, see Major Parts and Materials.

⚠ ATTENTION

- When considering the possibility of using this product in situations or environments not specifically noted in the Catalog or User's Manual, or in applications where safety is an important requirement, such as in an airplane facility, combustion equipment, leisure equipment, safety equipment and other places where human life or assets may be greatly affected, take adequate safety precautions such as application with enough margins for ratings and performance or fail-safe measures. Be sure to consult us with such applications.
- Always check the catalog and other reference materials for product wiring and piping.
- Install a muffler, etc. on the exhaust port. It is effective in reducing exhaust noise.
- When handling the product, wear protective gloves, safety glasses, safety boots, etc. to keep safety.
- When the product can no longer be used, or is no longer necessary, dispose of it appropriately as industrial waste.
- Pneumatic equipment can exhibit degraded performance and function over its operating life. Always conduct daily inspections of the pneumatic equipment, and confirm that all requisite system functions are satisfied, to prevent accidents from happening.
- Air leaks from the valve are not zero. For application of requiring holding pressure (including vacuum) inside the pressure vessel, consider adequate margin of capacity and holding time in design of the system.
- For inquiries about the product, consult your nearest Koganei sales office or Koganei overseas department. The address and telephone number is shown on the back cover of this catalog.

⚠ OTHERS

- Always observe the following items.
  1. When using this product in pneumatic systems, always use genuine KOGANEI parts or compatible parts (recommended parts).
     When conducting maintenance and repairs, always use genuine KOGANEI parts or compatible parts (recommended parts). Always observe the required methods and procedure.
  2. Do not attempt inappropriate disassembly or assembly of the product relating to basic construction, or its performance or functions.

  Koganei cannot be responsible if these items are not properly observed.

Mounting

1. While any mounting direction is allowed, be sure to avoid strong shocks or vibrations applied directly to the body. Also, avoid strong shocks in the lateral direction when using a mounting base for installation. For the order code, see the Additional Parts item under each series.
2. Avoid using in the locations and environment listed below, as it could result in malfunction of the valve. If use in such conditions is unavoidable, always provide a cover or other adequate protective measures.
- Location directly exposed to water drops or oil drops
- Environment where a valve body is subject to dew condensation
- Location directly exposed to machining chips, dust, etc

3. Install a muffler, etc. in the exhaust port to prevent dust from entering into the piping.
4. In piping connection with valves, flush the tube completely (by blowing compressed air) before piping.
   Intrusion of machining chips or sealing tape, rust, etc., generated during plumbing could result in air leaks and other defective operations.
5. When mounting a valve unit inside the control panels or when the operation requires long energizing periods, consider providing heat radiation measure such as ventilation.
6. Never use the valve with the 4(A) and 2(B) ports vent to atmosphere.

Media

1. Use air for the media. For the use of any other media, consult us.
2. Air used for the cylinder should be clean air that contains no deteriorated compressor oil, etc. Install an air filter (filtration of 40 μm or less) near the valve to remove collected liquid or dust. In addition, drain the air filter periodically.
3. When supply pressure is low, use piping for the 1(P) port with sufficient tube size.

Lubrication

Can be used without lubrication. When the actuator requires lubrication, use Turbine Oil Class 1 (ISO VG32) or the equivalent. Avoid using spindle oil or machine oil.

Atmosphere

The product cannot be used when the media or ambient atmosphere contains any of the substances listed below.
Organic solvents, phosphate ester type hydraulic oil, sulphur dioxide, chlorine gas, or acids, etc.

How to find the flow rate

Subsonic speed flow when
$P_1 + 0.1013 < 1.89\ (P_2 + 0.1013)$

$$Q = 226S\sqrt{\Delta P\ (P_2 + 0.1013)}$$

Sonic speed flow when
$P_1 + 0.1013 \geqq 1.89\ (P_2 + 0.1013)$

$$Q = 113S\ (P_1 + 0.1013)$$

Q: Air flow rate〔ℓ/min (ANR)〕
S: Effective area〔mm^2〕
ΔP: Pressure drop $P_1 - P_2$〔MPa〕
P_1: Upstream pressure〔MPa〕
P_2: Downstream pressure〔MPa〕

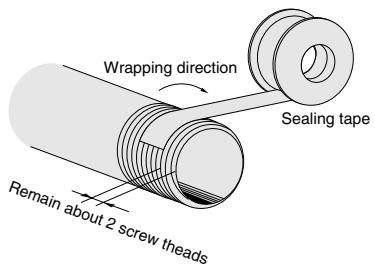
※ Corrections for variances in air temperature
Multiply the flow rate calculated in the formula above by the coefficients in the table below.

Air temperature °C [°F]	–20 [–4]	–10 [14]	0 [32]	10 [50]	30 [86]	40 [104]	50 [122]	60 [140]
Correction coefficient	1.08	1.06	1.04	1.02	0.98	0.97	0.95	0.94

Piping

Since the 1(P) and exhaust ports are on both ends of the manifold, piping direction can be selected depending on the application (excluding some models).
At shipping, plugs are temporarily screwed in ports at one end, but are not firmly tightened. Regardless of which end piping is connected, always remove the plugs, use sealing tape or apply other sealing agent, and securely tighten the plugs into the unused ports.

1. Sealing tape wrapping method
① Before piping, use air blowing (flushing) or cleaning to eliminate any machining chips, cutting oil, or dust, etc., remaining inside the pipes.
② When screwing in piping or fittings, caution should be taken to avoid letting machining chips or sealing materials from entering into the valves. When using sealing tape, wrap it so that 1.5～2 screw threads remain.



2. Tightening torque for piping

Connection thread	Suitable tightening torque N·cm (kgf·cm) [in·lbf]
M3	59 (6) [5.2]
M5×0.8	157 (16) [13.9]
Rc (PT)1/8	686～883 (70～90) [60.8～78.1]
Rc (PT)1/4	1177～1373 (120～140) [104～122]
Rc (PT) 3/8	2157～2354 (220～240) [191～208]
Rc (PT) 1/2	2746～2942 (280～300) [243～260]
Rc (PT) 3/4	2746～2942 (280～300) [243～260]
Rc (PT) 1	3530～3727 (360～380) [313～330]
Rc (PT) 1 1/4	3923～4119 (400～420) [347～365]
Rc (PT) 1 1/2	4707～4903 (480～500) [417～434]

Block-off plate

To close the unused stations, use a block-off plate.
For the order code, see the Additional Parts item under each series.

Cautions:
1. For the 1(P) port piping, use a size that matches the manifold's piping connection port.
2. When installing piping or mufflers to the exhaust port, ensure there will be minimum exhaust resistance.
3. On rare occasions, exhaust can interfere with other valves and actuators. In this case, let exhaust from the R ports on both ends.
4. When a multiple number of valves are operating simultaneously on a multi-unit manifold, or during high frequency applications, supply air from the 1(P) ports on both ends, and let exhaust from the R ports on both ends.
5. Since the twin solenoid valve uses 2 stations, it cannot be mounted on the final station.
6. In the 025 series, the seal between the valve and manifold is used reversed top-to-bottom, in accordance with the valve function (NC or NO). Install the seal as the mark (NC or NO) is located on the valve side and matches the valve function.

Tube installation and removal

Insert the tube to connect as far as the tube stopper contacts the tubes. Pull the tube to confirm the connection.
For tube removal, push the release ring forward parallel to the ring, and pull the tube out.

Tubes

Either nylon or urethane tubes can be used. Use tubes that are not scratched on their outer surface.
The tube's outer diameter tolerance should be within ±0.1mm [±0.004in.] of the nominal dimension, and within 0.2mm [0.008in.] for the ellipticity (difference between long and short diameter).

Caution: Do not excessively bend the tube near fittings.