



SOLENOID VALVES 050 SERIES INDEX

SOLENOID VALVES 050 SERIES

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Caution

Before use, be sure to read the "Safety Precautions" on p. 31.

The standard for square and direct acting types

SOLENOID VALVES 050 SERIES






Offers reliable control of $\phi 6$ [0.236in.] $\sim \phi 25$ [0.984in.] 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.

Standard Type

- The poppet type sealing method is used. Almost no problem with sticking due to collected liquid, etc. for assured operation.
- An overspring construction prevents excessive force being applied to the O-ring. Demonstrates excellent durability.
- A flywheel diode is standard equipment for the AC solenoid (optional for the DC24V). Eliminates solenoid burning and humming.
- A wide selection of options responds to diversified requirements. Units with LED indicators are now available.



050 Series Basic Models and Configuration

Single unit				
Standard type				
2-, 3-port		5-port		
Normally closed (NC)	Normally open (NO)	Single solenoid	2-position Double solenoid	Normally closed (NC)
				
050E1	050E1-11	050-4E1	050-4E2	050LE1

Manifold

- Allows combination mounting of 2-, 3- or 5-port valves, with single or double solenoids.






SOLENOID VALVES 050 SERIES

Low current type



- Power consumption is only half of the standard type. Demonstrates its features through reduced initial costs and running costs.
- Basic structure is identical to the standard type. Achieves excellent reliability and durability.
- Direct drive via IC or sequencer is also available.

Low current type	
2-, 3-port	5-port
Normally open (NO)	2-position Single solenoid
	
050LE1-11	050-4LE1

Manifold
Standard type, low current type
Manifold for combination mounting of 2-, 3-, 5-port valves

SM□

SOLENOID VALVES

050 SERIES

Basic Models and Functions

Item	Basic model	Standard type			Low current type	
		050E1	050-4E1	050-4E2	050LE1	050-4LE1
Number of positions		2 positions			2 positions	
Number of ports		2, 3 ports	5 ports		2, 3 ports	5 ports
Valve function	Normally closed (NC, standard) or Normally open (NO, optional)		Single solenoid	Double solenoid	Normally closed (NC, standard) or Normally open (NO, optional)	Single solenoid

Remark: For optional specifications and order codes, see p.137 ~ 138.

Specifications

Item	Basic model	Standard type			Low current type	
		050E1	050-4E1	050-4E2	050LE1	050-4LE1
Media		Air			Air	
Operation type		Direct acting type			Direct acting type	
Effective area [Cv]	mm ²	1.5 [0.08]	1.2 [0.07]		1.5 [0.08]	1.2 [0.07]
Port size ^{Note 1}		M5×0.8			M5×0.8	
Lubrication		Not required			Not required	
Operating pressure range	MPa {kgf/cm ² } [psi.]	0~0.7 {0~7.1} [0~102]		0.15~0.7 {1.5~7.1} [22~102]	0~0.7 {0~7.1} [0~102]	
Proof pressure	MPa {kgf/cm ² } [psi.]	1.05 {10.7} [152]			1.05 {10.7} [152]	
Response time ^{Note 2}	DC24V	20/20 or below		20 or below	30/30 or below	
ON/OFF	ms	AC100V, AC200V		25/25 or below	20 or below	
Maximum operating frequency	Hz	5			5	
Minimum time to energize for self holding	ms	—		50	—	
Operating temperature range (atmosphere and media)	°C [°F]	0~50 [32~122]			0~50 [32~122]	
Shock resistance m/s ² {G}	Lateral direction	1373.0 {140.0}			1373.0 {140.0}	
	Axial direction	294.2 {30.0}		147.1 {15.0}	294.2 {30.0}	
Mounting direction		Any			Any	

Notes: 1. For details, see the port size on p.136.

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

Solenoid Specifications

Item	Rated voltage	Standard type				Low current type	
		DC24V	AC100V		AC200V		DC24V
Type		DC type	Flywheel 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]
Maximum 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(-) ^{Note 3}
Color of LED indicator (optional)		Red	Yellow		Green		Red
Surge suppression	Standard	—				Flywheel diode	
	Optional	Flywheel diode		—		Flywheel diode	

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

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

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

Solenoid Valve Port Size

Basic model	Port specification	Port size
050E1 ^{Note} , 050-4E1 050-4E2 050LE1 ^{Note} , 050-4LE1	Standard	Female thread M5×0.8
	Optional	Female thread 1(P), 4(A), 2(B) port: Rc1/8 3(R2), 5(R1) port: M5×0.8

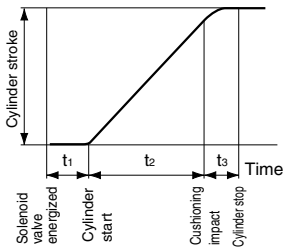
Note: The output ports of 050E1 and 050LE1 are the (2A) port.

Manifold Port Size

Manifold model	Port	Location of piping port	Port size
SM□	1(P)	Manifold	Rc 1/8
	4(A), 2(B)	Valve	M5×0.8 ^{Note}
	3, 5(R)	Manifold	Rc 1/8

Note: For standard specification valves. In the case of optional ports -01: Rc1/8.

Cylinder Operating Speed

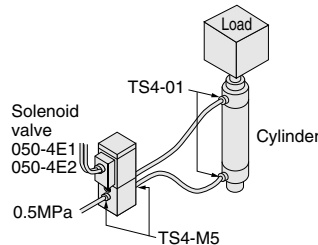


To obtain the time required for the cylinder to complete 1 stroke, add the cylinder's delay time t_1 (time between energizing of the solenoid valve and actual starting of the cylinder), to the cylinder's max. speed operating time t_2 . When a cushion is used, add the cushioning time t_3 , to the above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

050-4E1, 050-4E2

Measurement conditions

- Air pressure: 0.5MPa {5.1kgf/cm²} [73 psi.]
- Piping inner diameter and length: $\phi 2.5 \times 1000$ mm
- Fitting: Quick fitting TS4-M5, TS4-01
- Load ratio = $\frac{\text{Load}}{\text{Cylinder theoretical thrust}}$ (%)
- Cylinder stroke: 100mm [3.9 in.]



Solenoid Valve Mass

g [oz.]

Basic model	Mass
050E1	190 [6.70] (185 [6.53])
050-4E1	190 [6.70] (185 [6.53])
050-4E2	400 [14.11]
050LE1	295 [10.41] (290 [10.23])
050-4LE1	295 [10.41] (290 [10.23])

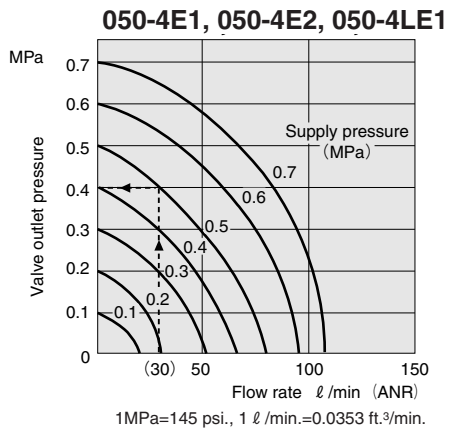
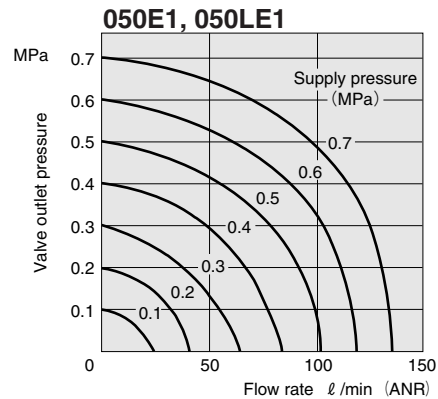
Remark: Figures in parentheses () are for port size Rc1/8: -01.

Manifold Mass

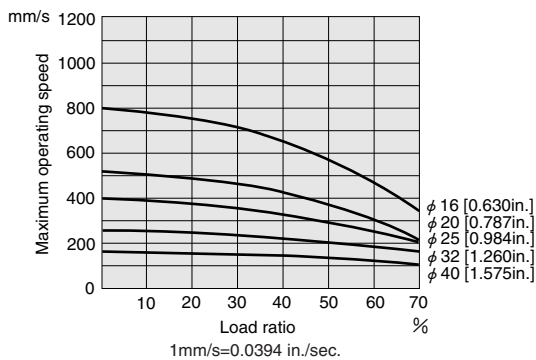
g [oz.]

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

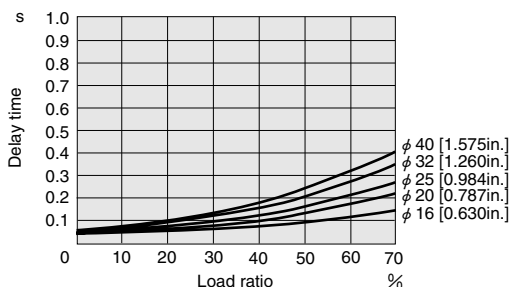
Flow Rate



Maximum operating speed



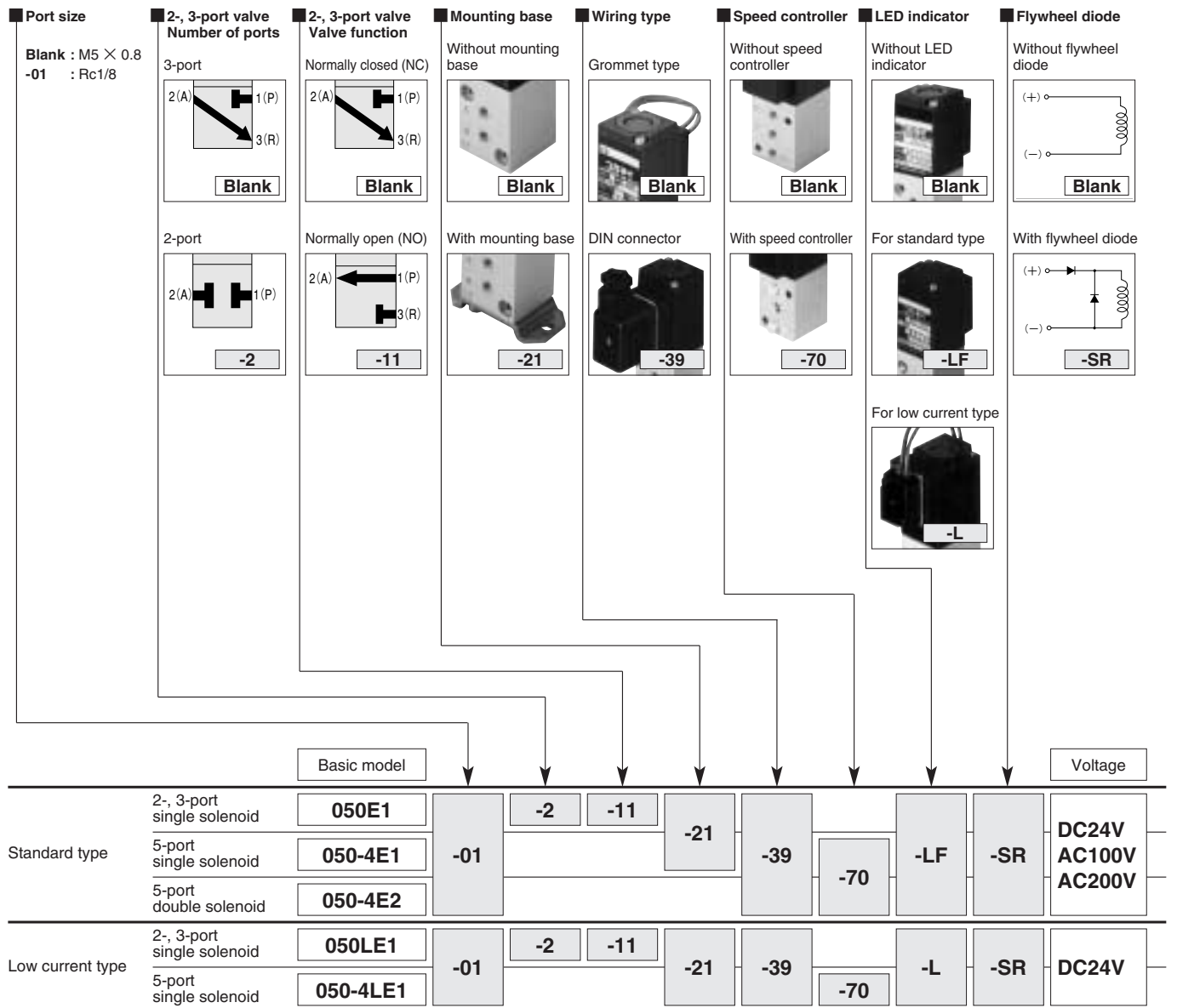
Delay time



How to read the graph

When the supply pressure is 0.5MPa [73 psi.] and flow rate is 30 l/min [1.06ft³/min.] (ANR), the valve outlet pressure becomes 0.4 MPa [58 psi.].

050 Series Solenoid Valve Order Codes (Standard Type, Low Current Type)



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

● Not available with DIN connector

● For DC24V only.
Equipped for AC100V and AC200V as standard.

050 Series Manifold Order Codes (Standard Type, Low Current Type)

		Port size	2-, 3-port valve Number of ports	2-, 3-port valve Valve function	Wiring type	LED indicator	Flywheel diode					
		Blank : M5 × 0.8 -01 : Rc1/8	3-port Blank	Normally closed (NC) Blank	Grommet type Blank	Without LED indicator Blank	Without flywheel diode Blank					
			2-port -2	Normally open (NO) -11	DIN connector -39	For standard type -LF	With Flywheel diode -SR					
						For low current type -L						
		Manifold model Number of units	Station	Basic model					Voltage			
Standard type	SM	2 ⋮ 10	stn. <input type="checkbox"/> ⋮ stn. <input type="checkbox"/>	-050E1	-01	-2	-11	-39	-LF	-SR	DC24V AC100V AC200V	
				-050-4E1								
				-050-4E2								
Low current type				-050LE1	-01	-2	-11	-39	-L	-SR	DC24V	
				-050-4LE1								

● Valve mounting location from the left-hand side when facing the 4(A), 2(B) ports.

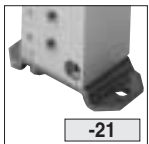
● Not available with DIN connector.

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

● Specify the valve type 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.

Options

Mounting base



-21

- For direct piping
- Not available with double solenoid

Speed controller



-70

- For direct piping
- Not available with 3-port

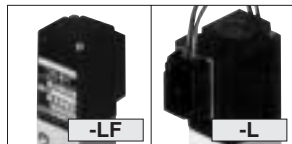
DIN connector



-39

- Cannot be used with -LF and -L

With built-in LED indicator

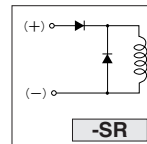


-LF

-L

- For standard type
- For low current type

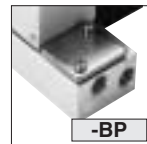
With built-in flywheel diode



-SR

- For DC24V only

Block-off plate

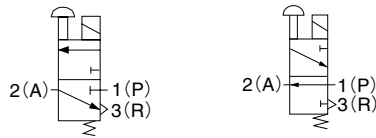


-BP

Operating Principles and Symbols

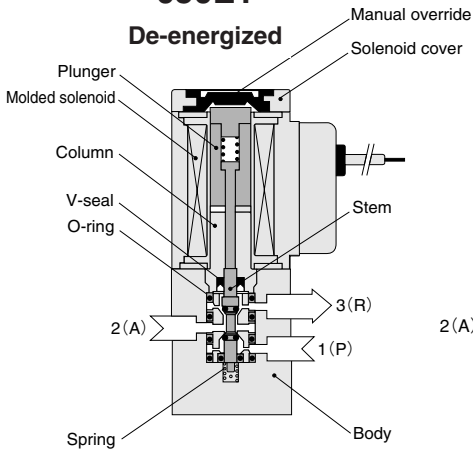
3-port

Normally closed (NC) Normally open (NO)



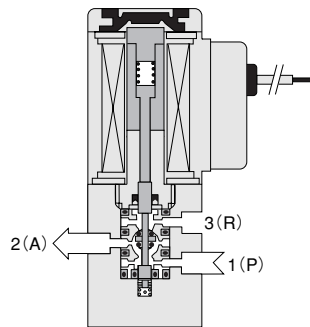
050E1

De-energized



050E1-11

De-energized



Major Parts and Materials

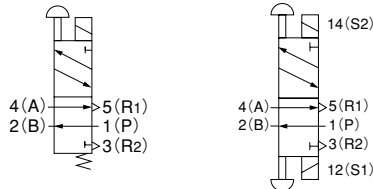
	Parts	Materials
Valve	Body	Aluminum alloy (anodized)
	Stem	Brass
	V-seal, O-ring	Synthetic rubber
	Mounting base	Mild steel (zinc plated)
	Spring	Piano wire
	Plunger	Magnetic stainless steel
Manifold	Column	Magnetic steel
	Body	Aluminum alloy (anodized)
	Block-off plate	Mild steel (zinc plated)
	Seal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

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

5-port

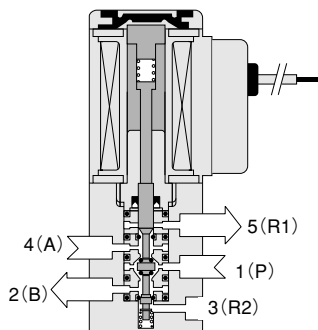
Single solenoid

Double solenoid



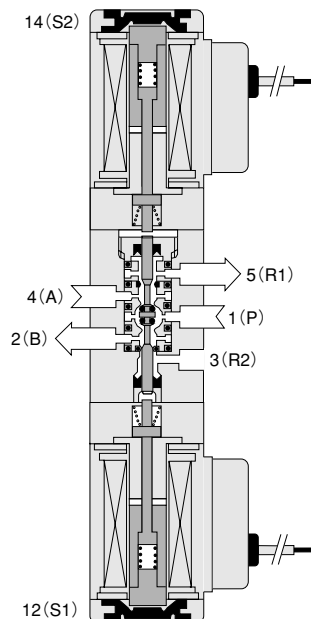
050-4E1

De-energized



050-4E2

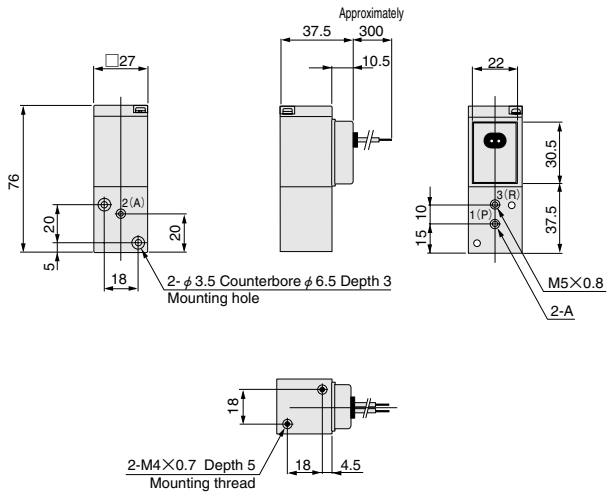
(De-energized condition after energizing solenoid S1)



Dimensions of Standard Type Solenoid Valve (mm)

2-, 3-port

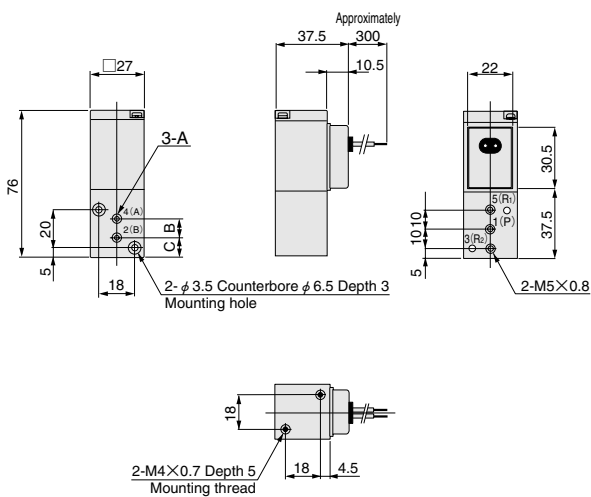
050E1



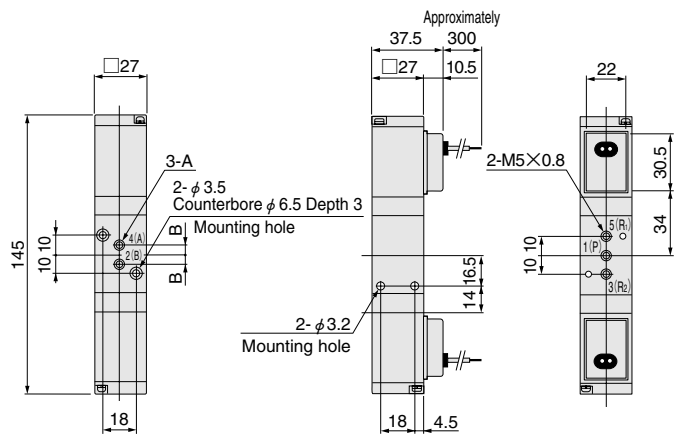
Code		A
Model	050E1	M5×0.8
	050E1-01	Rc1/8

5-port

050-4E1



050-4E2

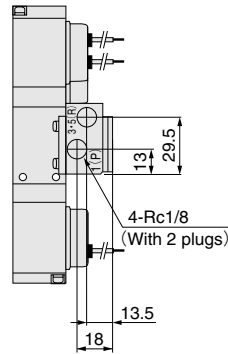
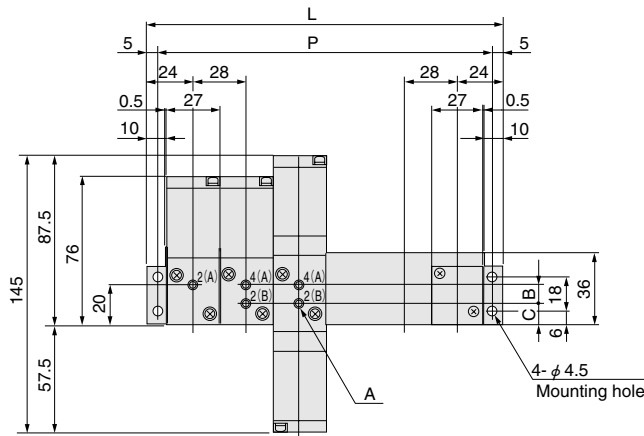


Code		A	B	C
Model	050-4E1	M5×0.8	10	10
	050-4E1-01	Rc1/8	16	7

Code		A	B
Model	050-4E2	M5×0.8	5
	050-4E2-01	Rc1/8	8

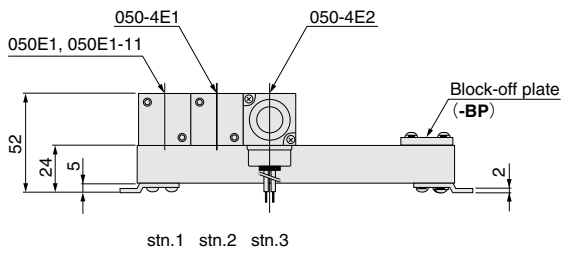
Dimensions of Standard Type Manifold (mm)

SM □



Unit dimensions

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

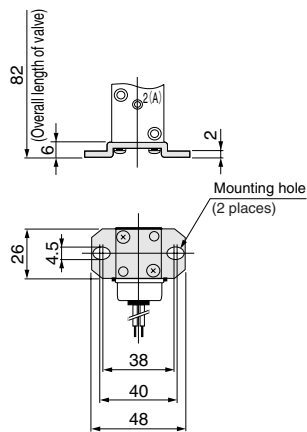


Code	A	B	C
Model			
050E1	M5×0.8	—	—
050E1-01	Rc1/8	—	—
050-4E □	M5×0.8	10	10
050-4E □-01	Rc1/8	16	7

Options (mm)

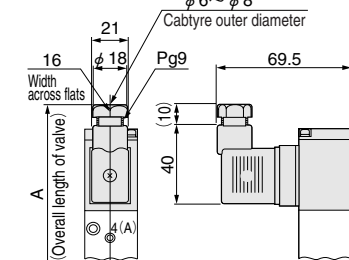
● Mounting base: -21

● For standard type



● Solenoid with DIN connector: -39

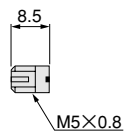
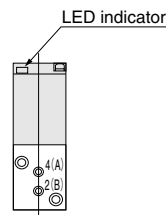
● For standard type



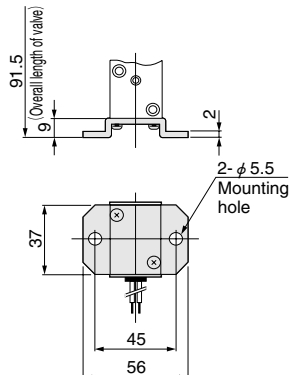
Model	Code	A
050E1		87
050-4E1		
050-4E2		171

● Solenoid with LED indicator: -LF

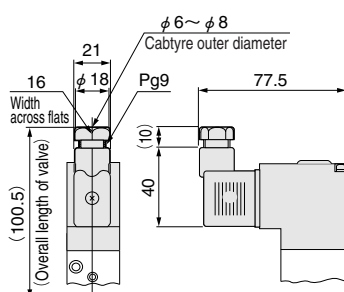
● For standard type



● For low current type

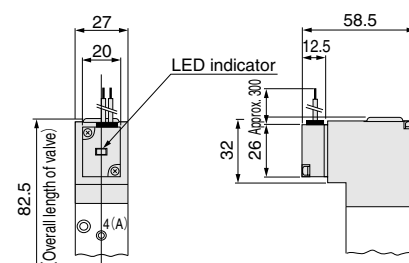


● For low current type



● Solenoid with LED indicator: -L

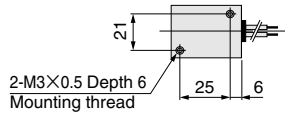
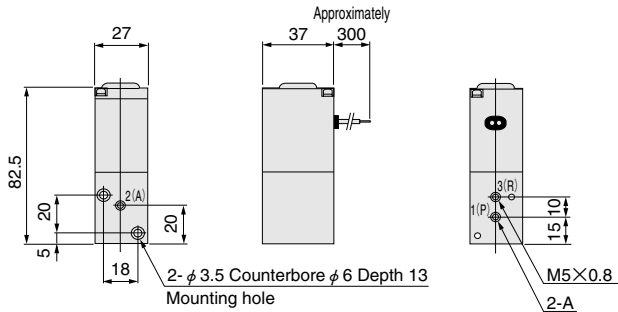
● For low current type



Dimensions of Low Current Type Solenoid Valve (mm)

2-, 3-port

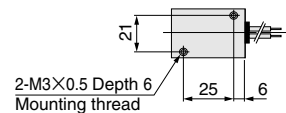
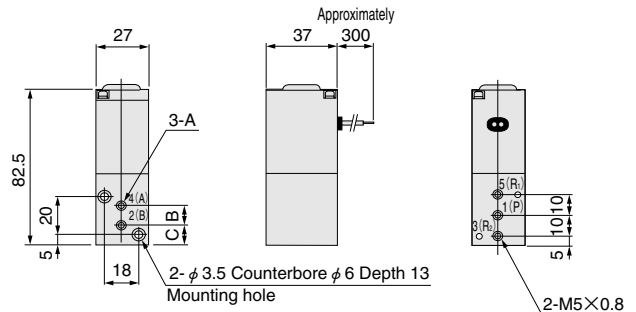
050LE1



Code	A
050-4LE1	M5×0.8
050-4LE1-01	Rc1/8

5-port

050-4LE1

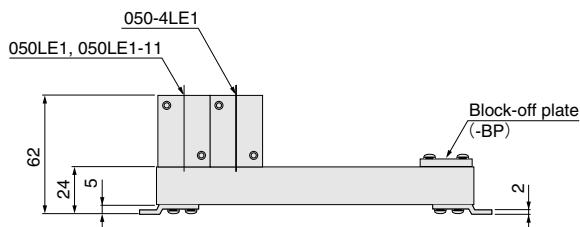
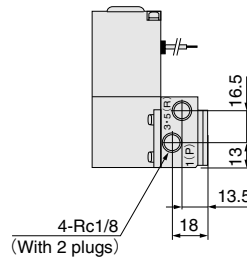
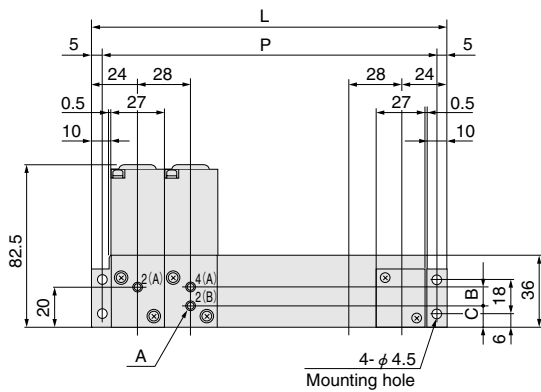


Code	A	B	C
050-4LE1	M5×0.8	10	10
050-4LE1-01	Rc1/8	16	7

SOLENOID VALVES 050 SERIES

Dimensions of Low Current Type Manifold (mm)

SM□



Unit dimensions

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

Code	A	B	C
050LE1 050-4LE1	M5×0.8	10	10
050LE1-01 050-4LE-01	Rc1/8	16	7

For options, see p.141.

Handling Instructions and Precautions

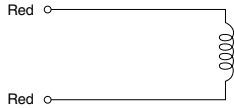


Solenoid

Internal circuit

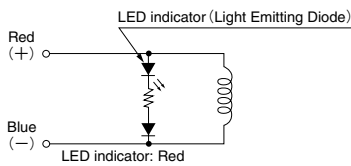
●DC24V

Standard solenoid



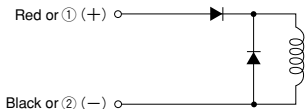
Solenoid with LED indicator

Order code: -LF, -L



Solenoid (Surge suppression)

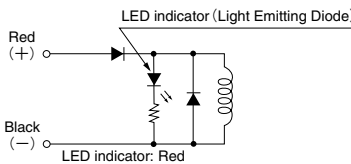
Order code: -SR



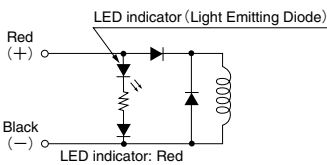
① and ② are for with DIN connector (Order code: -39).

Solenoid with LED indicator (Surge suppression)

Standard type Order code: -LF-SR

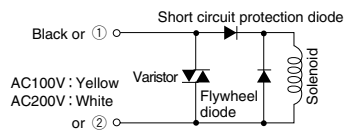


Low current type Order code: -L-SR



●AC100V, AC200V

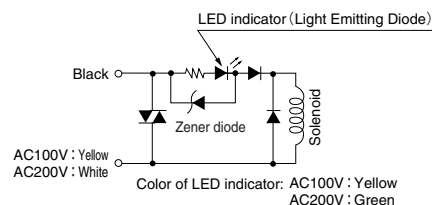
Standard solenoid (Surge suppression)



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

Solenoid with LED indicator (Surge suppression)

Order code: -LF



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

2. The DC solenoid will not short circuit even if the wrong polarity is applied, but the surge suppression solenoid valve will not operate. In addition, in solenoids with an LED indicator, the LED will not light up.

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

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

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

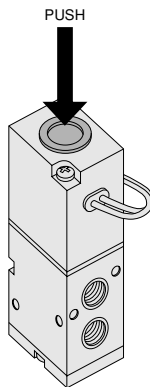


Manual override

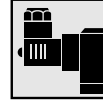
Non-locking type

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



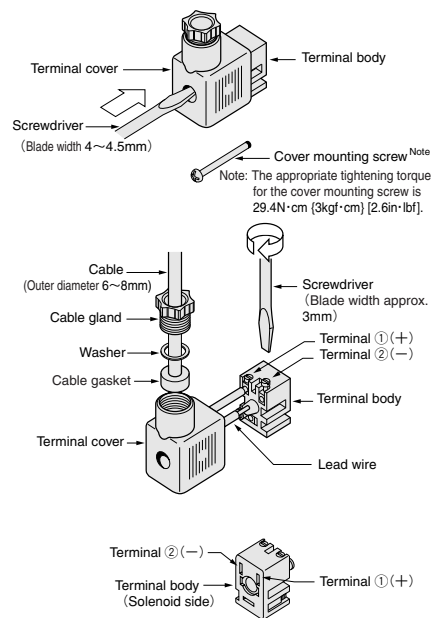
※ Illustration shows the 200 series.



DIN connector

Wiring instructions

Remove the cover mounting screws, and lift the terminal cover off from the solenoid. Use a screwdriver (blade width 4~4.5mm [0.16~0.18in.]), etc. to push strongly against the terminal body through the hole of the terminal cover's mounting screw, and remove the terminal body. Slip a cable gland, washer, and cable gasket over a cable (outer diameter 6~8mm [0.24~0.31in.]), insert the cable into the terminal cover's wiring port, and connect the lead wire to the terminal body (screwdriver blade width of about 3mm [0.12in.]).



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