KOGANEI

VALVES GENERAL CATALOG

SOLENOID VALVES
050 SERIES
INDEX

⚠ **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 φ6 [0.236in.] ～ φ25 [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)	2-position		Normally closed (NC)
		Single solenoid	Double solenoid	
050E1	**050E1-11**	**050-4E1**	**050-4E2**	**050LE1**

Manifold

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

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

Basic model / Item	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

Basic model / Item	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〕 mm²	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/cm²} [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/cm²} [psi.]	1.05 {10.7} [152]			1.05 {10.7} [152]	
Response time Note2 ON/OFF ms DC24V	20/20 or below		20 or below	30/30 or below	
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/s²{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

Rated voltage / Item	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　　71 〔83〕　〔79〕	48　　46 〔50〕　〔48〕	100 (2.4W) 〔112 (2.7W)〕
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

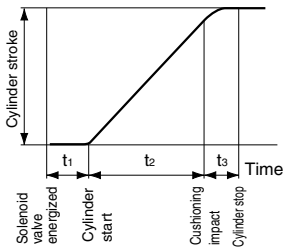| Basic model	Port specification		Port size
050E1[Note], **050-4E1** **050-4E2** **050LE1**[Note], **050-4LE1**	Standard	Female thread	M5×0.8
	Optional	Female thread	1(P), 4(A), 2(B) port: Rc1/8 3(R2), 5(R1) port: M5×0.8

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.

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.]

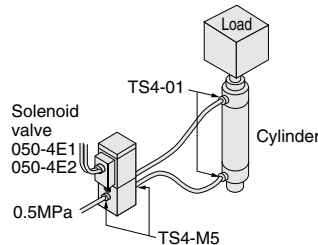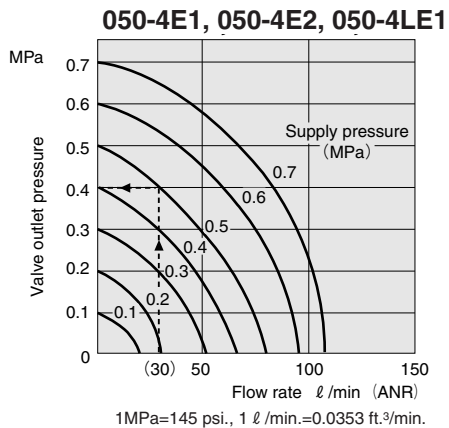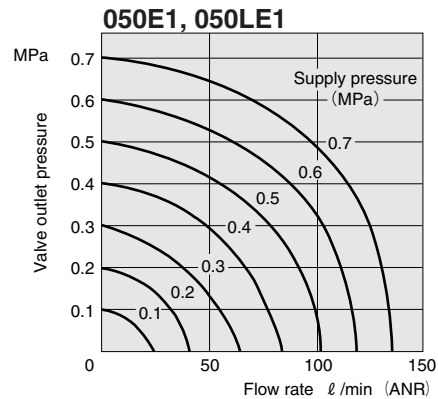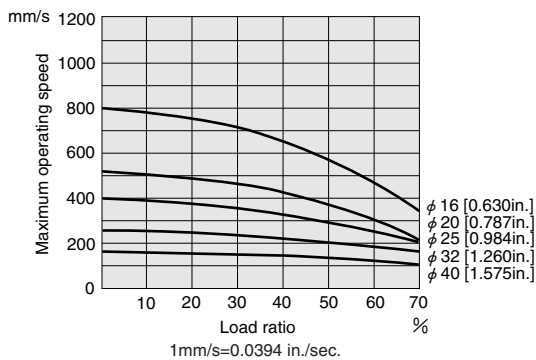| Manifold model	Mass calculation of each unit (n＝number of units)	Block-off plate
SM□	(47×n)＋30 [(1.66×n)＋1.06]	20 [0.71]

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/cm^2} [73 psi.]
● Piping inner diameter and length: ϕ 2.5×1000mm
● Fitting: Quick fitting TS4-M5, TS4-01
● Load ratio＝ $\dfrac{Load}{Cylinder\ theoretical\ thrust}$ (%)
● Cylinder stroke: 100mm [3.9 in.]

Maximum operating speed

1mm/s=0.0394 in./sec.

Delay time

Flow Rate

050E1, 050LE1

050-4E1, 050-4E2, 050-4LE1

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

How to read the graph
When the supply pressure is 0.5MPa [73 psi.] and flow rate is 30 ℓ /min [1.06ft.^{3}/min.] (ANR), the valve outlet pressure becomes 0.4 MPa [58 psi.].

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

■ Port size

Blank : M5 × 0.8
-01 : Rc1/8

■ 2-, 3-port valve Number of ports

3-port
2(A) — 1(P), 3(R)
Blank

2-port
2(A) — 1(P)
-2

■ 2-, 3-port valve Valve function

Normally closed (NC)
2(A) — 1(P), 3(R)
Blank

Normally open (NO)
2(A) ← 1(P), 3(R)
-11

■ Mounting base

Without mounting base
Blank

With mounting base
-21

■ Wiring type

Grommet type
Blank

DIN connector
-39

■ Speed controller

Without speed controller
Blank

With speed controller
-70

■ LED indicator

Without LED indicator
Blank

For standard type
-LF

For low current type
-L

■ Flywheel diode

Without flywheel diode
(+), (−)
Blank

With flywheel diode
(+), (−)
-SR

		Basic model									Voltage
Standard type	2-, 3-port single solenoid	**050E1**	-01	-2	-11	-21	-39		-LF	-SR	DC24V AC100V AC200V
	5-port single solenoid	**050-4E1**						-70			
	5-port double solenoid	**050-4E2**									
Low current type	2-, 3-port single solenoid	**050LE1**	-01	-2	-11	-21	-39		-L	-SR	DC24V
	5-port single solenoid	**050-4LE1**						-70			

● 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.

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

■ **Port size**

Blank : M5 × 0.8
-01 : Rc1/8

■ **2-, 3-port valve Number of ports**

3-port
2(A) — 1(P), 3(R)
Blank

2-port
2(A) — 1(P)
-2

■ **2-, 3-port valve Valve function**

Normally closed (NC)
2(A) — 1(P), 3(R)
Blank

Normally open (NO)
2(A) — 1(P), 3(R)
-11

■ **Wiring type**

Grommet type
Blank

DIN connector
-39

■ **LED indicator**

Without LED indicator
Blank

For standard type
-LF

For low current type
-L

■ **Flywheel diode**

Without flywheel diode
(+), (−)
Blank

With Flywheel diode
(+), (−)
-SR

	Manifold model Number of units	Station	Basic model						Voltage
Standard type	SM	2 ⋮ 10	stn.☐ ⋮ stn.☐	-050E1 / -050-4E1 / -050-4E2	-01	-2 -11	-39	-LF	-SR	DC24V AC100V AC200V
Low current type				-050LE1 / -050-4LE1	-01	-2 -11	-39	-L	-SR	DC24V

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

● 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.

● Not available with DIN connector.

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

Options
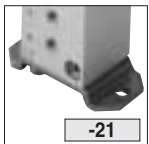
Mounting base
-21
● For direct piping
● Not available with double solenoid

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
● For standard type
-L
● For low current type

With built-in flywheel diode
(+), (−)
-SR
● For DC24V only
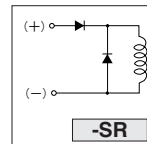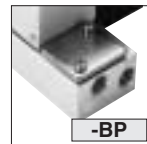
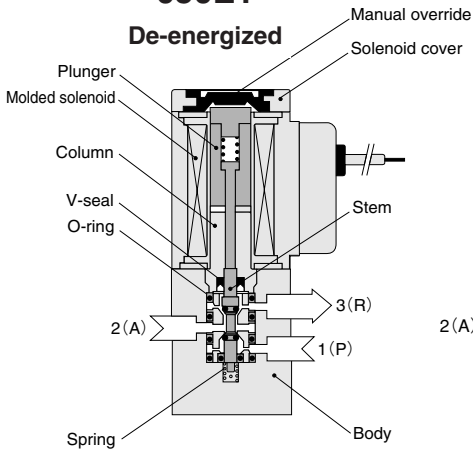Block-off plate
-BP

Operating Principles and Symbols

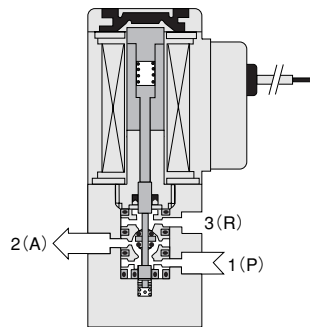### 3-port

Normally closed (NC)

2(A) — 1(P) / 3(R)

Normally open (NO)

2(A) — 1(P) / 3(R)

050E1
De-energized

Manual override
Solenoid cover
Plunger
Molded solenoid
Column
V-seal
O-ring

3(R)
2(A)
1(P)
Stem
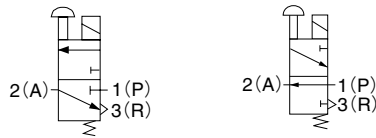
Spring
Body

050E1-11
De-energized

3(R)
2(A)
1(P)

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
	Column	Magnetic steel
Manifold	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

4(A) — 5(R1)
2(B) — 1(P)
3(R2)

Double solenoid

14(S2)
4(A) — 5(R1)
2(B) — 1(P)
3(R2)
12(S1)
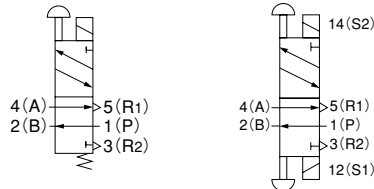
050-4E1
De-energized

5(R1)
4(A)
1(P)
2(B)
3(R2)
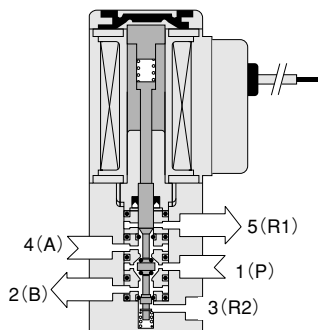
050-4E2
(De-energized condition after energizing solenoid S1)

14(S2)
5(R1)
4(A)
1(P)
2(B)
3(R2)
12(S1)
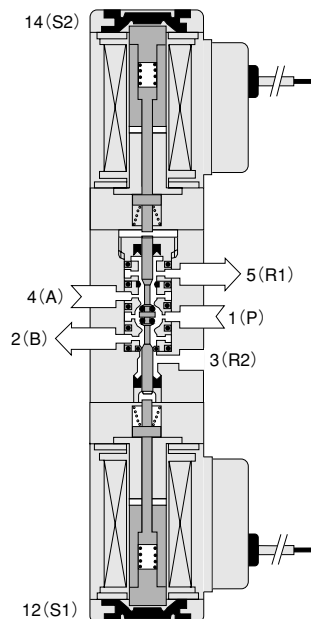
Dimensions of Standard Type Solenoid Valve (mm)

2-, 3-port

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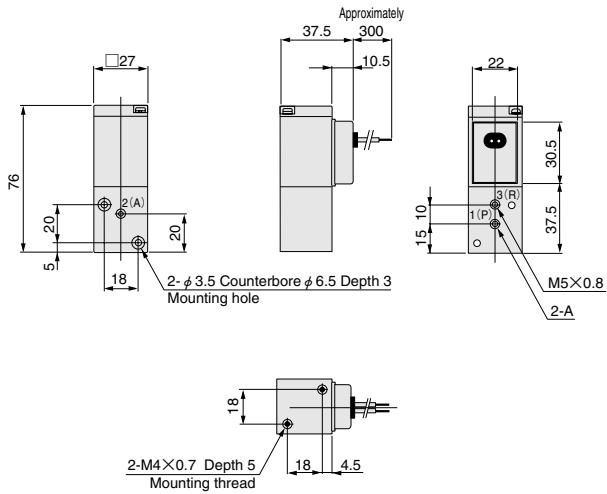
Code Model	A
050E1	M5×0.8
050E1-01	Rc1/8

5-port

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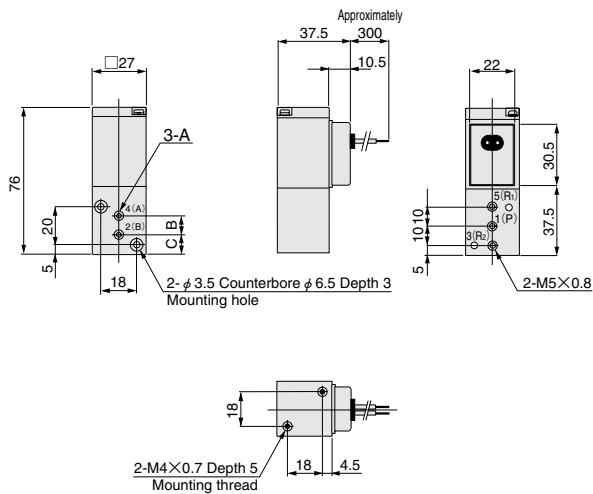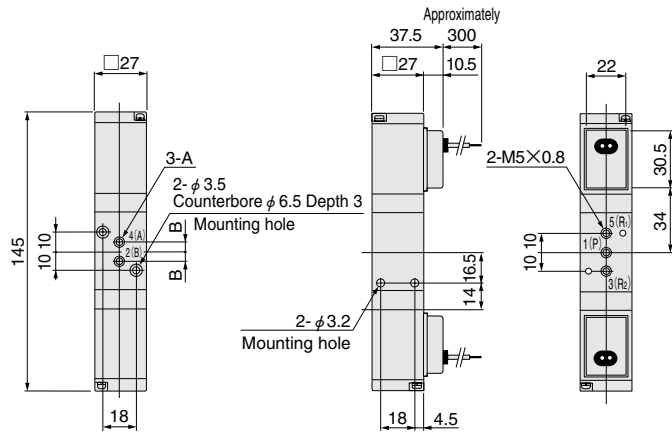
Code Model	A	B	C
050-4E1	M5×0.8	10	10
050-4E1-01	Rc1/8	16	7

050-4E2

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

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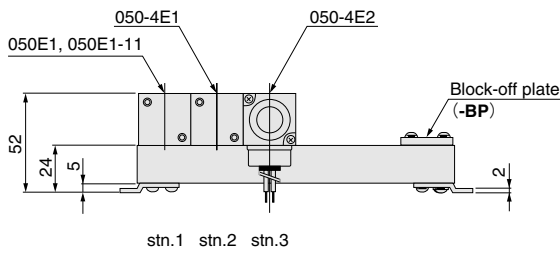
Code / Model	A	B	C
050E1	M5×0.8	—	—
050E1-01	Rc1/8	—	—
050-4E☐	M5×0.8	10	10
050-4E☐-01	Rc1/8	16	7

050E1, 050E1-11   050-4E1   050-4E2

Block-off plate (-BP)

stn.1 stn.2 stn.3

Options (mm)

● Mounting base: **-21**

● For standard type

● For low current type
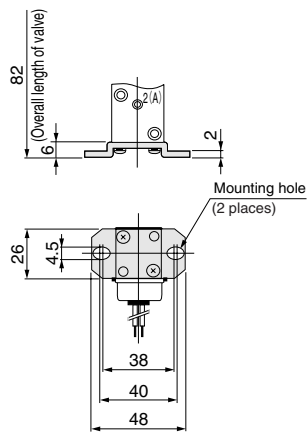
● Solenoid with DIN connector: **-39**

● For standard type

Code / Model	A
050E1 / 050-4E1	87
050-4E2	171
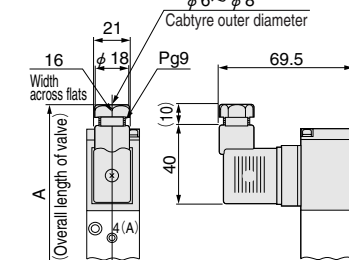
● For low current type

● Solenoid with LED indicator: **-LF**

● For standard type
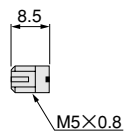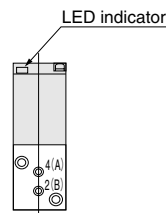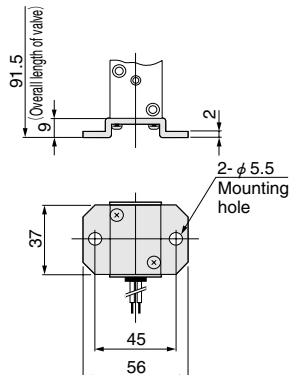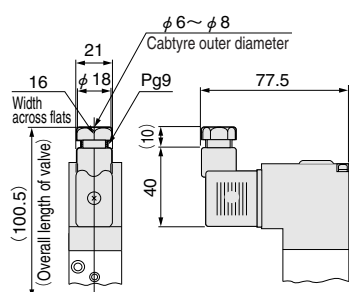
● Solenoid with LED indicator: **-L**
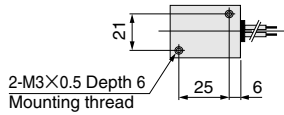
● For low current type

● Speed controller: **-70**

M5×0.8

141
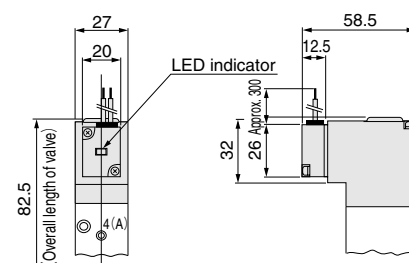
Dimensions of Low Current Type Solenoid Valve (mm)

2-, 3-port

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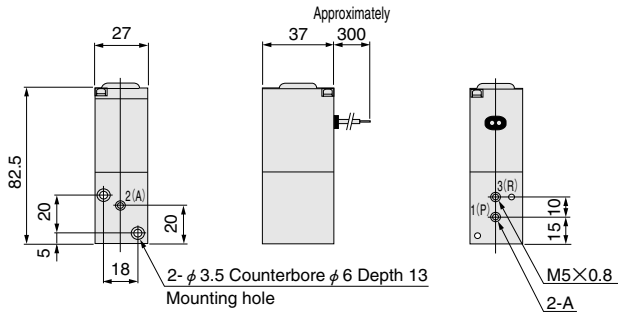
	Code	A
Model		
050-4LE1		M5×0.8
050-4LE1-01		Rc1/8

5-port

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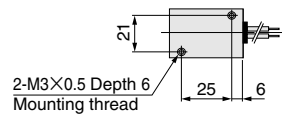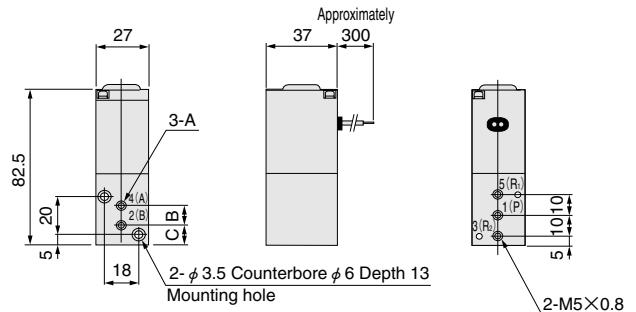
	Code	A	B	C
Model				
050-4LE1		M5×0.8	10	10
050-4LE1-01		Rc1/8	16	7

Dimensions of Low Current Type Manifold (mm)

SM□
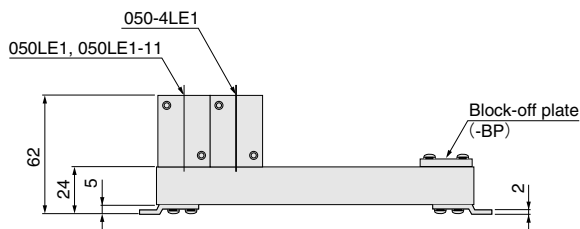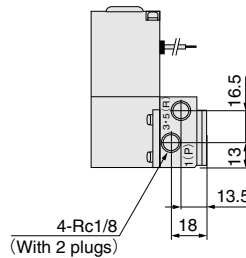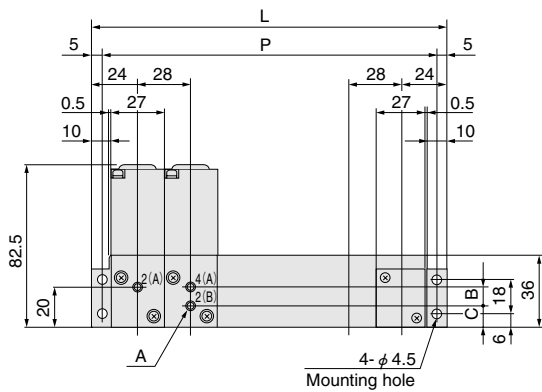
050-4LE1

050LE1, 050LE1-11

Block-off plate (-BP)

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

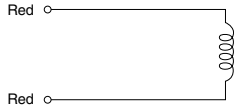|	Code	A	B	C
Model				
050LE1 050-4LE1		M5×0.8	10	10
050LE1-01 050-4LE-01		Rc1/8	16	7

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Handling Instructions and Precautions
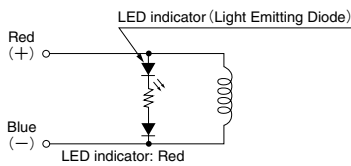
Solenoid
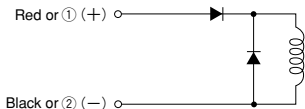
Internal circuit

● DC24V
Standard solenoid

Red

Red

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

LED indicator (Light Emitting Diode)

Red (+)

Blue (−)

LED indicator: Red

Solenoid (Surge suppression)
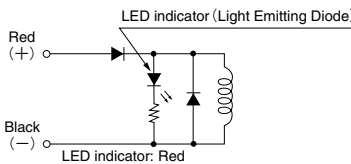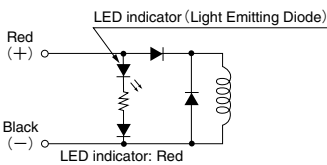#### Order code: -SR

Red or ① (+)

Black or ② (−)

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

Solenoid with LED indicator (Surge suppression)
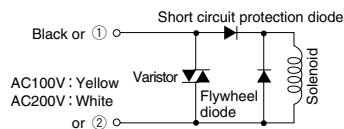#### Standard type   Order code: -LF-SR

LED indicator (Light Emitting Diode)

Red (+)

Black (−)

LED indicator: Red

Low current type   Order code：-L-SR

LED indicator (Light Emitting Diode)

Red (+)

Black (−)

LED indicator: Red

● AC100V, AC200V
Standard solenoid (Surge suppression)

Short circuit protection diode

Black or ①

AC100V : Yellow
AC200V : White
or ②

Varistor

Flywheel diode
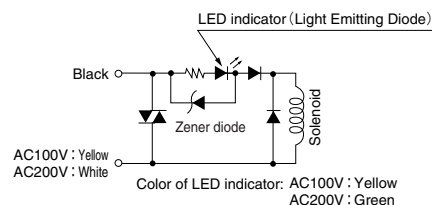
Solenoid

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

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

LED indicator (Light Emitting Diode)

Black

AC100V : Yellow
AC200V : White

Zener diode

Solenoid

Color of LED indicator: AC100V : Yellow
AC200V : Green

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).
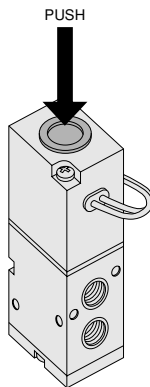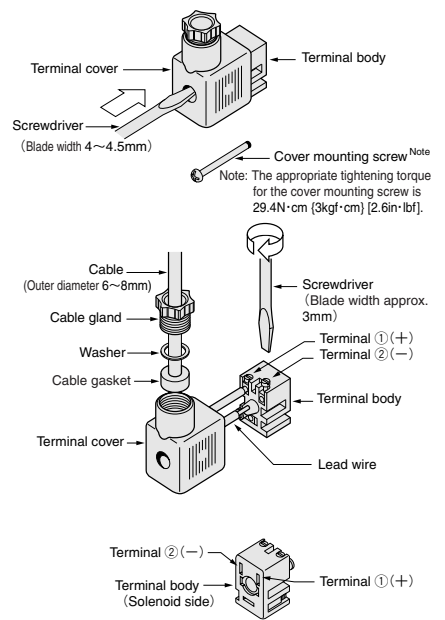
PUSH

※ Illustration shows the 200 series.
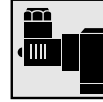
DIN connector

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.]).

Terminal cover

Terminal body

Screwdriver (Blade width 4～4.5mm)

Cover mounting screw Note

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

Cable (Outer diameter 6～8mm)

Cable gland

Washer

Cable gasket

Terminal cover

Screwdriver (Blade width approx. 3mm)

Terminal ① (+)
Terminal ② (−)

Terminal body

Lead wire

Terminal ② (−)

Terminal body (Solenoid side)

Terminal ① (+)

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