

**KOGANEI**

Air Valve

---

**SOLENOID VALVES 180 SERIES**

**INSTRUCTION MANUAL** Ver.1.1

## General Precautions

### Mounting

- 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.
- 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
- Install a muffler, etc. in the exhaust port to prevent dust from entering into the piping.
- 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.
- 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.
- Never use the valve with the 4(A) and 2(B) ports vent to atmosphere.

### Media

- Use air for the media. For the use of any other media, consult us.
- 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.
- 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  
 $P_1 + 0.1013 \geq 1.89 (P_2 + 0.1013)$

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

Q: Air flow rate [ℓ/min (ANR)]  
 S: Effective area [mm<sup>2</sup>]  
 $\Delta P$ : Pressure drop  $P_1 - P_2$  [MPa]  
 P<sub>1</sub>: Upstream pressure [MPa]  
 P<sub>2</sub>: 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.

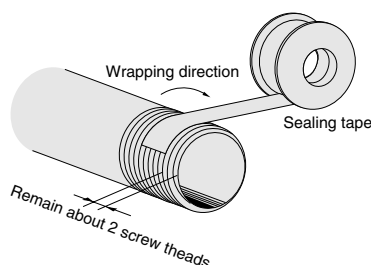
Air temperature °C [°F]	-20 [-4]	-10 [14]	0 [32]	10 [50]	30 [86]	40 [104]	50 [122]	60 [140]
Correction coefficient	1.08	1.06	1.04	1.02	0.98	0.97	0.95	0.94

### 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

- Before piping, use air blowing (flushing) or cleaning to eliminate any machining chips, cutting oil, or dust, etc., remaining inside the pipes.
- 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:**
- For the 1(P) port piping, use a size that matches the manifold's piping connection port.
  - When installing piping or mufflers to the exhaust port, ensure there will be minimum exhaust resistance.
  - On rare occasions, exhaust can interfere with other valves and actuators. In this case, let exhaust from the R ports on both ends.
  - 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.
  - Since the twin solenoid valve uses 2 stations, it cannot be mounted on the final station.
  - 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.

# Handling Instructions and Precautions

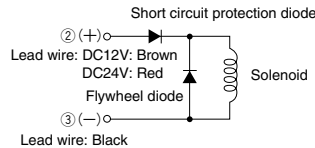


## Solenoid

### Internal circuit

#### ●DC12V, DC24V

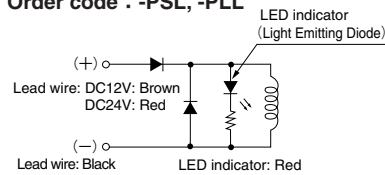
#### Standard solenoid (Surge suppression)



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

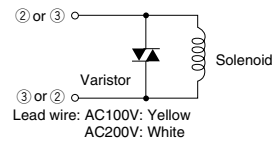
#### Solenoid with LED indicator (Surge suppression)

Order code : -PSL, -PLL



#### ●AC100V, AC200V

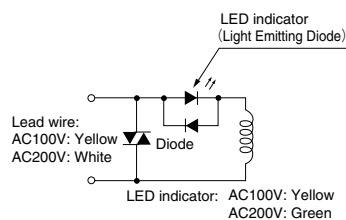
#### Standard solenoid (Surge suppression)



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

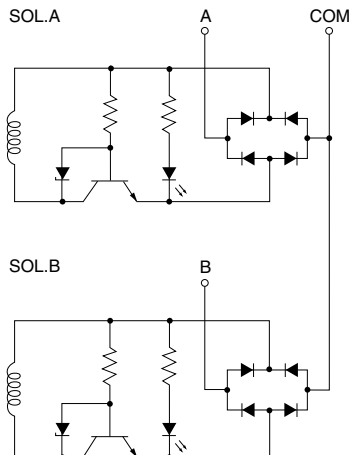
#### Solenoid with LED indicator (Surge suppression)

Order code : -PSL, -PLL



#### ●DC24V

#### Tandem solenoid



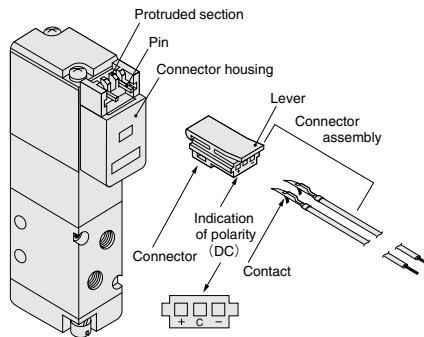
- Cautions:**
1. Do not apply megger between the lead wires.
  2. The DC solenoid will not short circuit even if the wrong polarity is applied, but the valve will not operate.
  3. Leakage current inside the circuit could result in failure of the solenoid valve to return, or in other erratic operation. Always use it within the range of the allowable leakage current. If circuit conditions, etc. cause the leakage current to exceed the allowable leakage current, consult us.
  4. For double solenoid and twin solenoid, avoid energizing both solenoids simultaneously. The valve could fall into a neutral position.



## Plug connector

### Attaching and removing plug connector

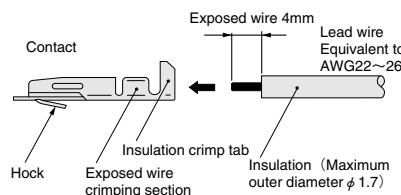
Use fingers to insert the connector into the pin, push it in until the lever claw latches onto the protruded section of the connector housing, and complete the connection. To remove the connector, squeeze the lever along with the connector, lift the lever claw up from the protruded section of the connector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



※ Illustration shows the 110 series.

### Crimping of connecting lead wire and contact

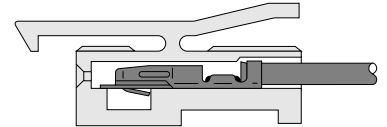
To crimp lead wires into contacts, strip off 4mm [0.16in.] of the insulation from the end of the lead wire, insert it into the contact, and crimp it. Be sure to avoid catching the insulation on the exposed wire crimping section.



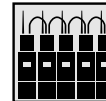
- Cautions:**
1. Do not pull hard on the lead wire.
  2. Always use a dedicated tool for crimping of connecting lead wire and contact.
- Contact: Model 702062-2M  
Manufactured by Sumiko Tech, Inc.  
Crimping tool: Model F1-702062  
Manufactured by Sumiko Tech, Inc.

### Attaching and removing contact and connector

Insert the contact with a 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.



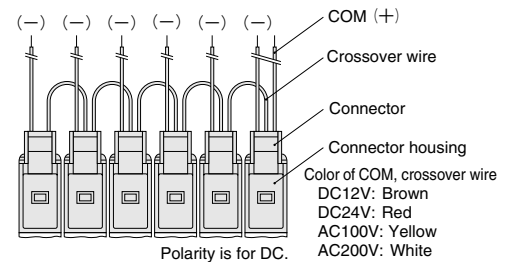
- Cautions:**
1. Do not pull hard on the lead wire. It could result in defective contacts, breaking wires, etc.
  2. If the pin is bent, use a small screwdriver, etc. to gently straighten out the pin, and then complete the connection to the plug connector.



## Common terminal pre-wired plug connector

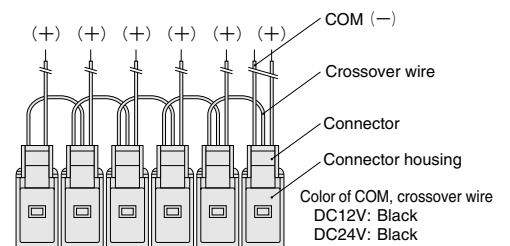
### 1. Pre-wired common terminal at DC positive side or AC.

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 the straight connector configuration. While the connector's orientation is different in the case of the L connector, in every case the first 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.

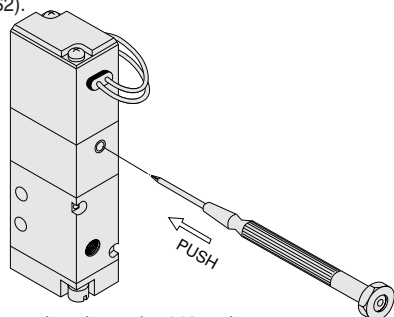


## Manual override

### Non-locking type

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

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

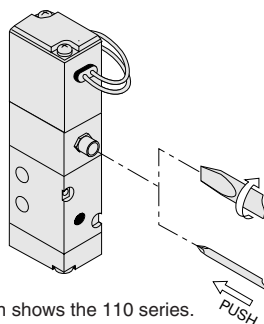


※ Illustration shows the 110 series.

### Locking protruding type

Use a small screwdriver to turn the adjusting knob several times in the clockwise direction, and lock the manual override in place. When locked, turning the adjusting knob several times in the counterclockwise direction releases a spring on the manual override, returns it to the normal position, and releases the lock.

For the locking protruding type, when the adjusting knob is not turned, this type acts just like the non-locking type, like the valve is the energized position as long as the manual override is pushed down, and it returns to the normal position upon release.



※ Illustration shows the 110 series.

**Cautions:** 1. The 180 series valves are internal pilot type solenoid valves. As a result, the manual override cannot switch the main valve without air supplied from the 1(P) port.

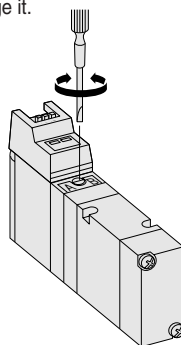
2. Always release the lock of the locking type and locking protruding type manual override before commencing normal operation.
3. Do not attempt to operate the manual override with a pin or other object having an extremely fine tip. It could damage the manual override button.
4. Do not turn the adjusting knob more than needed. It could result in defective operation.



## Manual override (Tandem solenoid)

### Locking type

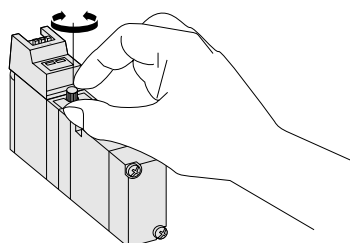
To lock the locking type manual override, use a small screwdriver to push down the manual override in all the way, then set the 0 position as the reference point and turn it in the clockwise direction as far as position A. This achieves the same conditions as when the 14(SA) side is energized, and the manual override is locked in place. For the 12(SB) side, turn it in the counterclockwise direction as far as position B. To release the lock, return the manual override to the 0 position. A spring mechanism returns the manual override to its normal position, and the lock is released. Care should be taken to avoid excessive turning of the manual override, which could damage it.



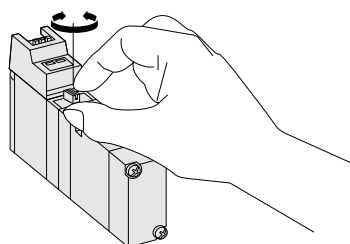
### Locking protruding type, locking manual lever type

To lock the locking protruding type manual override or locking manual lever type, use either a small screwdriver or your fingertips to push the manual override button (manual lever) all the way down, then set the 0 position as the reference point and turn it in the clockwise direction as far as position A. This achieves the same conditions as when the 14(SA) side is energized, and the manual override button (manual lever) is locked in place. For the 12(SB) side, turn it in the counterclockwise direction as far as position B. To release the lock, return the manual override button (manual lever) to the 0 position. A spring mechanism returns the manual override button (manual lever) to its normal position, and the lock is released. Care should be taken to avoid excessive turning of the manual override button (manual lever), which could damage it.

#### Locking protruding type manual override



#### Locking manual lever type



- Cautions:** 1. The 180 series valves are internal pilot type solenoid valves. As a result, the manual override cannot switch the main valve without air supplied from the 1(P) port.
2. Always release the lock of the locking protruding type manual override before commencing normal operation.
  3. Do not attempt to operate the manual override with a pin or other object having an extremely fine tip. It could damage the manual override button.
  4. Do not turn the adjusting knob more than needed. It could result in defective operation.

### Mounting base 180-21

When installing a mounting base to the valve, always use the provided screws. The recommended tightening torque for the screws is 49N·cm {5kgf·cm} [4.3in·lbf].

### Mounting valves on manifold

When mounting valves on manifold, apply the recommended tightening torque of 49N·cm {5kgf·cm} [4.3in·lbf] for the valve mounting screws.

## Made to Order

The 180 series Solenoid Valves include a variety of made to order solenoids for application in a wider range of control and wiring types.

### DIN connector



- When ordering, enter **-39** in place of the normal option code for the wiring type.
- LED indicator is not available.

### Wiring Outline

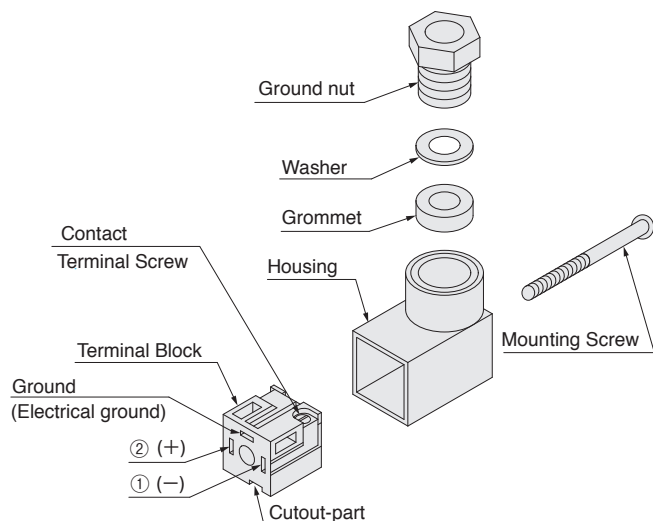
1. Loosen the mounting thread of the connector, and remove it from the valve.
2. After removing the mounting thread from the connector, pry the cutout-part from terminal block with the screwdriver to separate the terminal block and the housing.
3. Thread gland nut, washer, grommet to the cable, and plug into the wiring port of housing. Insert the conductor to the contact of terminal block, and tighten the terminal thread to fix the lead wire.

### Wiring Port Direction

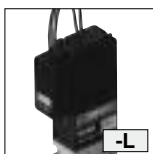
1. In order to alter the direction of wiring port, change the direction of terminal body by 90 degrees when putting the terminal body into terminal cover.

### Compatible Cab Tire Cord

- Use  $\phi 4\text{-}\phi 7$  outer diameter cable.
- (REFERENCE) Equal to JISC3306 0.5mm<sup>2</sup> double core cable and triple core cable



### LED indicator



The LED indicator for confirmation of operation is also available without a plug connector. This creates a clean monoblock look with a compact cover.

- When ordering, enter **-L** in place of the normal option code for the wiring type.
- A varistor for surge suppression is also equipped.  
(For the AC100V and AC200V only. For the DC12V and DC24V, a flywheel diode for surge suppression is installed as standard equipment.)

### Plug connector

Straight connector  
with LED indicator



- Without lead wire
- Connector and contacts included

L connector  
with LED indicator



- Without lead wire
- Connector and contacts included

- When ordering, enter **-PSLN** or **-PSLL** in place of the normal option code for the wiring type.

Lead wire length



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

- For lead wire length, **-1L** is 1000mm [39in.] and **-3L** is 3000mm [118in.].

When ordering, enter **-1L** or **-3L** following the wiring type option code.

■ CE Marking compliant product

\*Excluding tandem solenoid valves.

