CKD

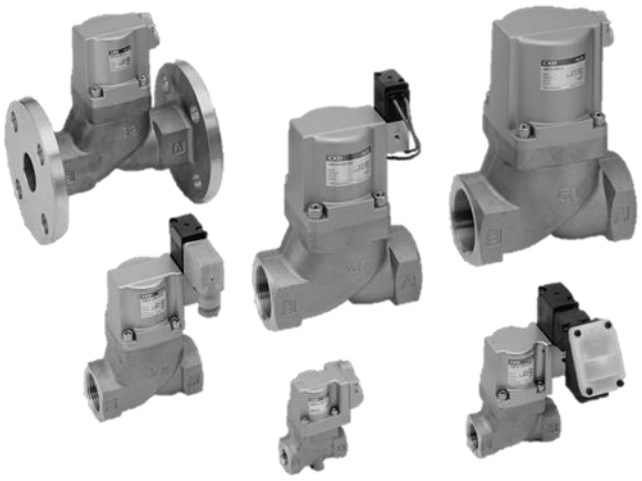
Cylinder Valve (For Air and Gas)

SAB□A Series

SVB□A Series (Solenoid Valve Mounted)

INSTRUCTION MANUAL

SM-50664-A/4



- Read this Instruction Manual before using the product.
- Read the safety notes carefully.
- Keep this Instruction Manual in a safe and convenient place for future reference.

CKD Corporation

PREFACE

Thank you for purchasing CKD's **"SAB□A Series/SVB□A Series" cylinder valve**.
This Instruction Manual contains basic matters such as installation and usage instructions in order to ensure optimal performance of the product. Please read this Instruction Manual thoroughly and use the product properly.
Keep this Instruction Manual in a safe place and be careful not to lose it.

Product specifications and appearances presented in this Instruction Manual are subject to change without notice.

- The product, which uses control valves such as solenoid valves, motor valves, and air operated valves, is intended for users who have basic knowledge about materials, fluids, piping, and electricity. CKD shall not be responsible for accidents caused by persons who selected or used the product without knowledge or sufficient training with respect to control valves.
- Since there are a wide variety of customer applications, it is impossible for CKD to be aware of all of them. Depending on the application or usage, the product may not be able to exercise its full performance or an accident may occur due to fluid, piping, or other conditions. It is the responsibility of the customer to check the product specifications and decide how the product shall be used in accordance with the application and usage.

SAFETY INFORMATION

When designing and manufacturing any device incorporating the product, the manufacturer has an obligation to ensure that the device is safe. To that end, make sure that the safety of the machine mechanism of the device, the pneumatic or water control circuit, and the electric system that controls such mechanism is ensured.

To ensure the safety of device design and control, observe organization standards, relevant laws and regulations, which include the following:

ISO 4414, JIS B 8370, JFPS 2008 (the latest edition of each standard), the High Pressure Gas Safety Act, the Industrial Safety and Health Act, other safety rules, organization standards, relevant laws and regulations

In order to use our products safely, it is important to select, use, handle, and maintain the products properly.
Observe the warnings and precautions described in this Instruction Manual to ensure device safety.

Although various safety measures have been adopted in the product, customer's improper handling may lead to an accident. To avoid this:

Thoroughly read and understand this Instruction Manual before using the product.

To explicitly indicate the severity and likelihood of a potential harm or damage, precautions are classified into three categories: "DANGER", "WARNING", and "CAUTION".

⚠ **DANGER**	Indicates an imminent hazard. Improper handling will cause death or serious injury to people.
⚠ **WARNING**	Indicates a potential hazard. Improper handling may cause death or serious injury to people.
⚠ **CAUTION**	Indicates a potential hazard. Improper handling may cause injury to people or damage to property.

Precautions classified as "CAUTION" may still lead to serious results depending on the situation.
All precautions are equally important and must be observed.

Other general precautions and tips on using the product are indicated by the following icon.

Indicates general precautions and tips on using the product.

Precautions on Product Use

⚠ WARNING

The product must be handled by a qualified person who has extensive knowledge and experience.

The product is designed and manufactured as a device or part for general industrial machinery.

Use the product within the specifications.

The product must not be used beyond its specifications. Also, the product must not be modified and additional work on the product must not be performed.

The product is intended for use in devices or parts for general industrial machinery. It is not intended for use outdoors or in the conditions or environment listed below.

- In applications for nuclear power, railroad system, aviation, ship, vehicle, medical equipment, and equipment that directly touches beverage or food.
- For special applications that require safety including amusement equipment, emergency shut-off circuit, press machine, brake circuit, and safety measures.
- For applications where life or properties may be adversely affected and special safety measures are required.

(Exception is made if the customer consults with CKD prior to use and understands the specifications of the product. However, even in that case, safety measures must be taken to avoid danger in case of a possible failure.)

Do not handle the product or remove pipes and devices until confirming safety.

- Inspect and service the machine and devices after confirming the safety of the entire system. Also, turn off the energy source (air supply or water supply) and power to the relevant facility. Release compressed air from the system and use extreme care to avoid water or electric leakage.
- Since there may be hot or live parts even after operation has stopped, use extreme care when handling the product or removing pipes and devices.
- When starting or restarting a machine or device that incorporates pneumatic components, make sure that a safety measure (such as a pop-out prevention mechanism) is in place and system safety is secured.

Precautions on Product Disposal

⚠ CAUTION

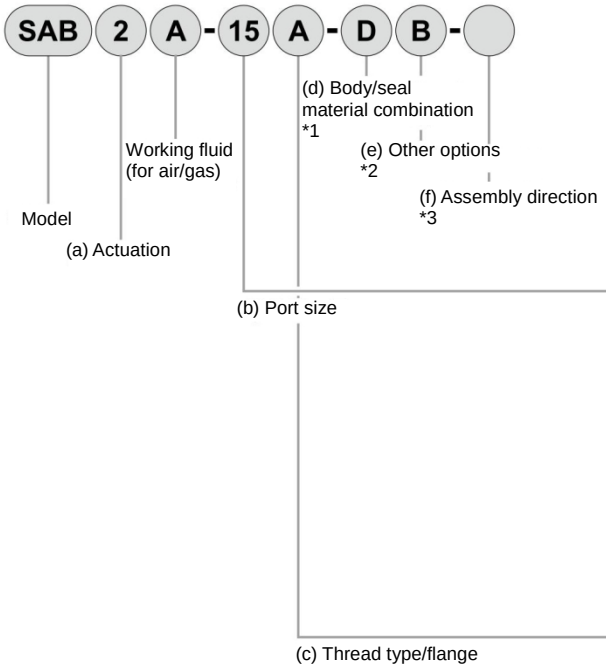
When disposing of the product, comply with laws pertaining to disposal and cleaning of wastes and have an industrial waste disposal company dispose of the product.

CONTENTS

1. PRODUCT OVERVIEW

1.1 Model Number Indication

1.1.1 SAB Series



Symbol	Description
(a) Actuation	
1	NC (normally closed)
2	NO (normally open)
3	Double-acting
(b) Port size	
8	1/4
10	3/8
15	1/2
20	3/4
25	1
32	1 1/4, 32 (flange)
40	1 1/2, 40 (flange)
50	2, 50 (flange)
65	65 (flange) (made-to-order product)
80	80 (flange) (made-to-order product)
(c) Thread type/flange	
A	Rc (8A to 50A)
F	Flange (32F to 80F)
G	G (8G to 50G)
N	NPT (8N to 50N)

(d) Body/seal material combination			
		Body	Seal
O	Standar	Bronze	Nitrile rubber
B	Option	Bronze	Fluoro rubber
P		Bronze	Ethylene-propylene rubber
D		Stainless steel	Nitrile rubber
E		Stainless steel	Fluoro rubber
R		Stainless steel	Ethylene-propylene rubber

(e) Other options	
Blank	No option
B	Mounting plate *2

(f) Assembly direction	
Blank	No option
R	Mounting plate assembly position reversed

Refer to the figures below for the layout drawing.

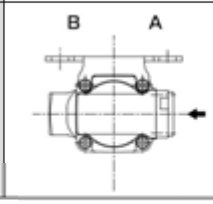
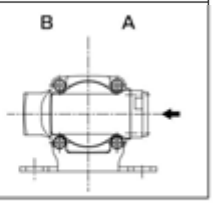
⚠ Precautions for model number selection

*1: For port size 65F or 80F, available body/seal material combinations are only O and B. Body material will be cast iron.
*2: The mounting plate (item (e): B) can be mounted only on the female thread of port sizes 8 to 32.
*3: Mounting plate assembly position reversed (item (f): B-R) is available for port sizes 15 to 32.
*4: Clockwise direction when viewed from above with port A on the right.

[Example of model number indication]
SAB2A-15A-DB

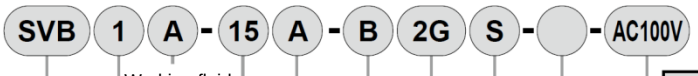
Model : SAB
(a) Actuation : NO (normally open)
(b) Port size : 1/2
(c) Thread type/flange : Rc
(d) Body/seal material combination
: Body is stainless steel, seal is nitrile rubber
(e) Other options : Mounting plate
(f) Assembly direction : No option

Item (f) Assembly direction

SAB *2, 4		
Symbol	B (Mounting plate)	B-R *3
Direction	No rotation	Mounting plate reversed
Layout		

The arrows show pilot port IN.

1.1.2 SVB Series



Symbol	Description
(a) Actuation	
1	NC (normally closed)
2	NO (normally open)
(b) Port size	
8	1/4
10	3/8
15	1/2
20	3/4
25	1
32	1 1/4, 32 (flange)
40	1 1/2, 40 (flange)
50	2, 50 (flange)
65	65 (flange) (made-to-order product)
80	80 (flange) (made-to-order product)
(c) Thread type/flange	
A	Rc (8A to 50A)
F	Flange (32F to 80F)
G	G (8G to 50G)
N	NPT (8N to 50N)

(d) Body/seal material combination			
		Body	Seal
O	Standar	Bronze	Nitrile rubber
B	Option	Bronze	Fluoro rubber
P		Bronze	Ethylene-propylene rubber
D		Stainless steel	Nitrile rubber
E		Stainless steel	Fluoro rubber
R		Stainless steel	Ethylene-propylene rubber

(e) Coil		
2C	Standar	Grommet lead wire
2G	Option	With DIN terminal box (Pg9)
2H		With DIN terminal box with lamp (Pg9)
3T		With T type terminal box (G1/2)
3R		With T type terminal box with lamp (G1/2)

(f) Other options	
Blank	No option
S	With surge suppressor
B	Mounting plate *2

(g) Assembly direction	
Blank	No option
X	Cylinder cover rotated 90°
Y	Cylinder cover rotated 180°
Z	Cylinder cover rotated 270°
R	Coil reversed 180° (with solenoid valve mounted) Mounting plate/coil reversed 180° (with solenoid valve mounted)

Refer to page 525 in the catalog for the layout drawing.

(h) Voltage	
AC100V	100 VAC 50/60 Hz 110 VAC 60 Hz
AC200V	200 VAC 50/60 Hz 220 VAC 60 Hz
DC24V	24 VDC

⚠ Precautions for model number selection

*1: For port size 65F or 80F, available body/seal material combinations are only O and B. Body material will be cast iron.
*2: The mounting plate (item (f): B) is mounted only on the female thread of port sizes 8 to 32.
*3: If adding both options (surge suppressor and mounting plate), indicate SB for (f).
*4: Surge suppressor is provided for the lead wire coil and is mounted in the terminal box for the coil with terminal box.
*5: Manual operation (non-locking type) is provided as standard.
*6: Assembly direction can be selected only for port sizes 8 to 50.

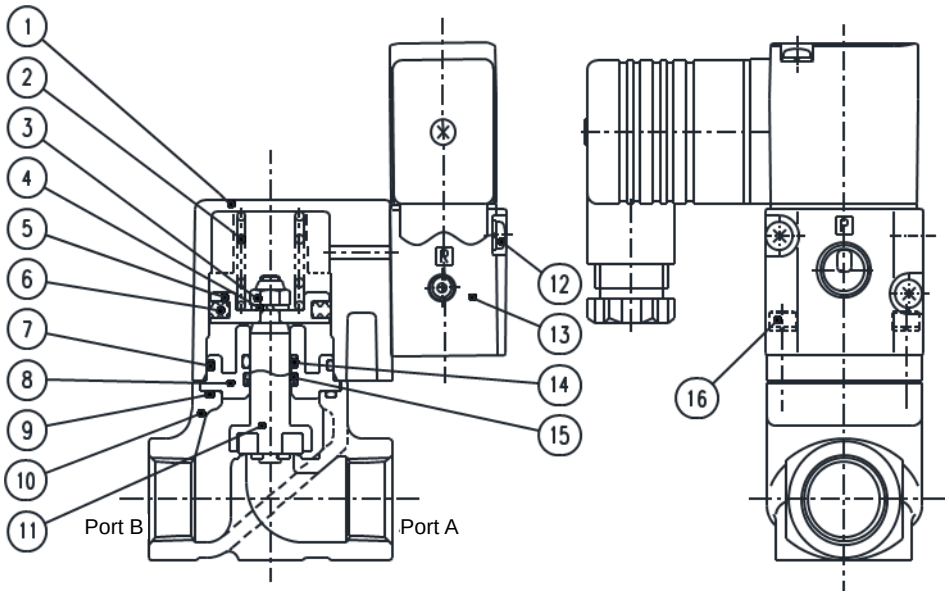
[Example of model number indication]
SVB1A-15A-B2GS-AC100V

Model	: SVB
(a) Actuation	: NC (normally closed)
(b) Port size	: 1/2
(c) Thread type/flange	: Rc
(d) Body/seal material combination	: Body is bronze, seal is fluoro rubber
(e) Coil	: With DIN terminal box (Pg9)
(f) Other options	: With surge suppressor
(g) Assembly direction	: No option
(h) Voltage	: 100 VAC 50/60 Hz, 110 VAC 60 Hz

1.2 Internal Structure

■ Internal structure of normally closed type 2-port valve

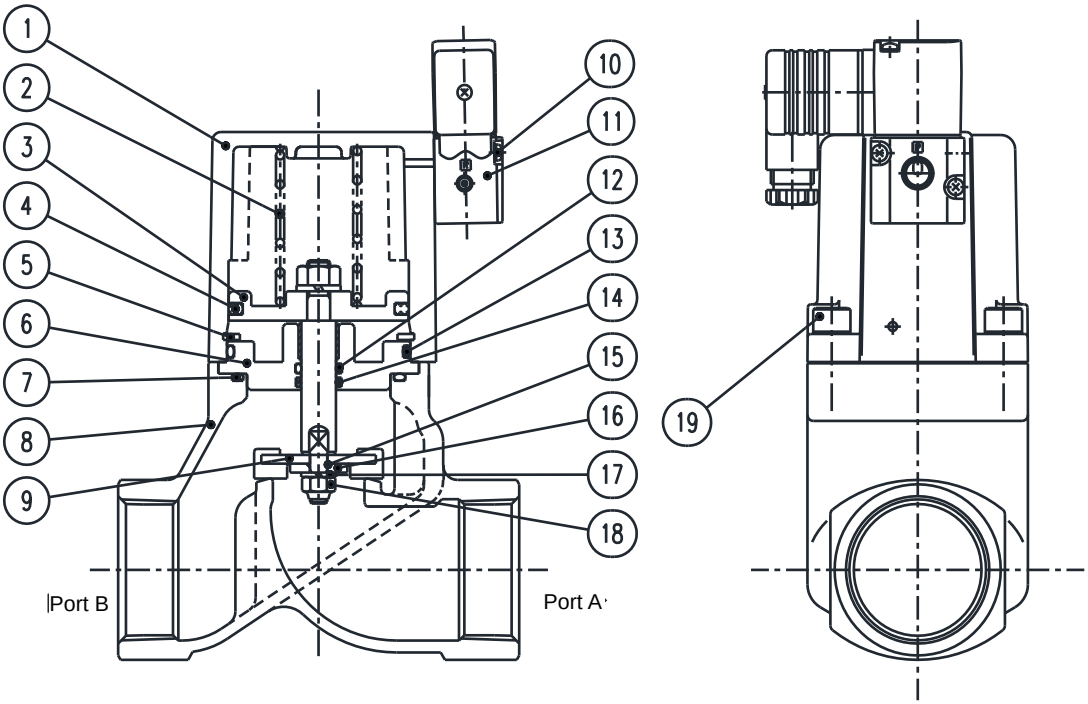
<Port size: 8A, 10A>



No.	Part name	Quantity
1	Cylinder cover	1
2	Spring	1
3	Lock nut	1
4	Spring washer	1
5	Piston	1
6	PSD packing	1
7	O-ring	1
8	Adaptor	1
9	O-ring	1
10	Body	1
11	Main valve assembly	1
12	Cross recessed pan head screw with washer	2
13	Pilot solenoid valve	1
14	O-ring	1
15	MY packing	1
16	Hexagon socket head bolt with washer	4

* The figure above shows solenoid valve mounted type SVB1A.
* SAB1A is not equipped with (13) pilot solenoid valve.

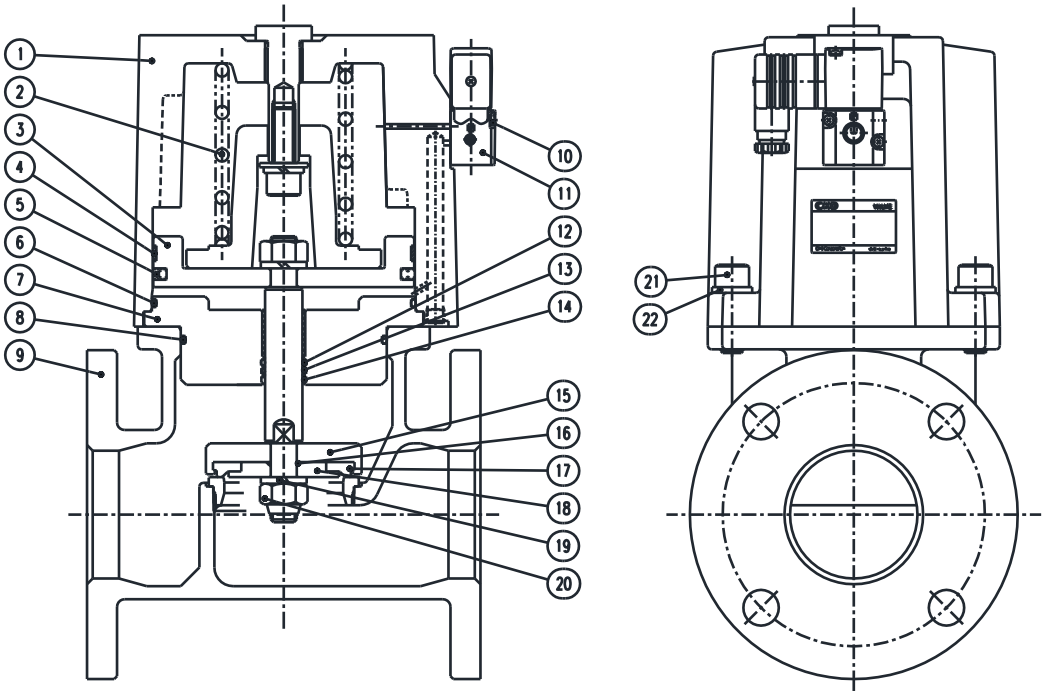
<Port size: 15A, 20A, 25A, 32A (F), 40A (F), 50A (F)>



No.	Part name	Quantity
1	Cylinder cover	1
2	Spring	1
3	Piston assembly	1
4	PSD packing	1
5	C-type stop ring	1
6	Adaptor	1
7	O-ring	1
8	Body	1
9	Main valve body	1
10	Cross recessed pan head screw with washer	2
11	Pilot solenoid valve	1
12	O-ring	1
13	O-ring	1
14	MY packing	1
15	O-ring	1
16	Seat spacer	1
17	Spring washer	1
18	Lock nut	1
19	Hexagon socket head bolt with washer	4

* The figure above shows solenoid valve mounted type SVB1A.
* SAB1A is not equipped with (11) pilot solenoid valve.
* For 32A to 50A, (19) hexagon socket head bolt with washer is a non-assembled type bolt (washer can be separated from the bolt).

<Port size: 65F, 80F>

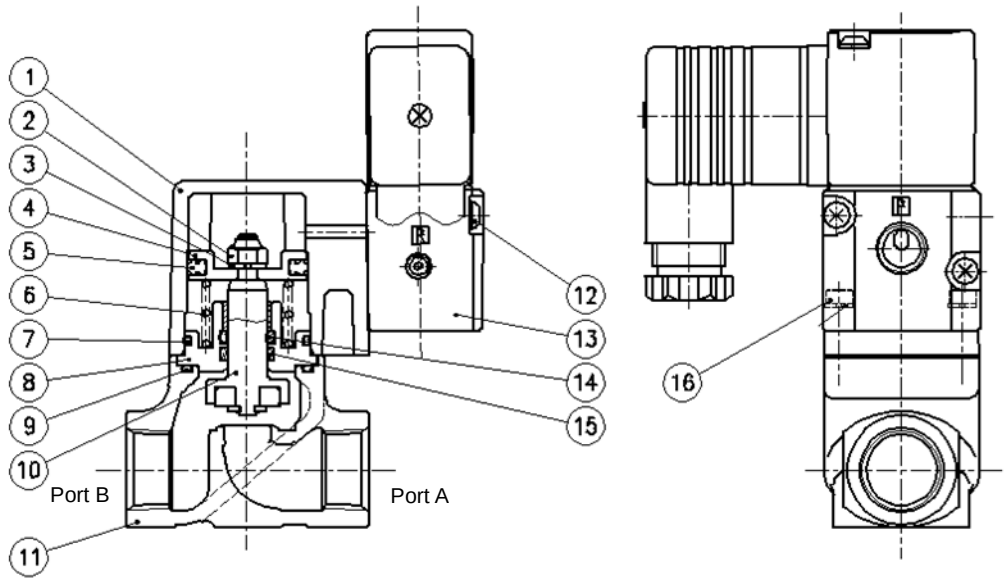


No.	Part name	Quantity
1	Cylinder cover	1
2	Spring	1
3	Piston assembly	1
4	Wear ring	1
5	PSD packing	1
6	O-ring	1
7	Adaptor	1
8	O-ring	1
9	Body assembly	1
10	Cross recessed pan head screw with washer	2
11	Pilot solenoid valve	1
12	O-ring	1
13	MY packing	1
14	Scraper	1
15	Valve body	1
16	O-ring	1
17	Main valve body	1
18	Seat spacer	1
19	Spring washer	1
20	Lock nut	1
21	Hexagon socket head bolt	4
22	Spring washer	4

* The figure above shows solenoid valve mounted type SVB1A.
* SAB1A is not equipped with (10) pilot solenoid valve.

■ Internal structure of normally open type 2-port valve

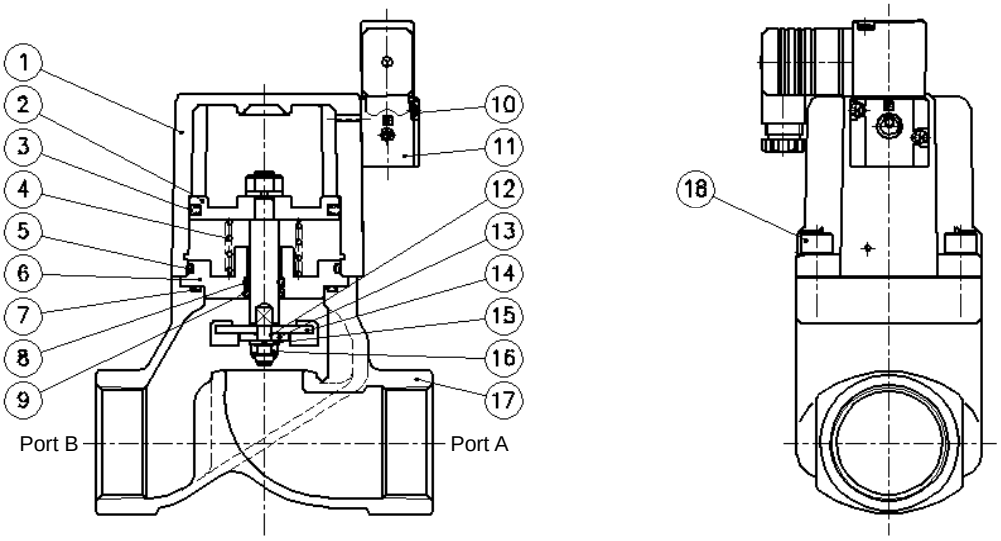
<Port size: 8A, 10A>



No.	Part name	Quantity
1	Cylinder cover	1
2	Lock nut	1
3	Spring washer	1
4	Piston	1
5	PSD packing	1
6	Spring	1
7	O-ring	1
8	Adaptor	1
9	O-ring	1
10	Main valve assembly	1
11	Body	1
12	Cross recessed pan head screw with washer	2
13	Pilot solenoid valve	1
14	O-ring	1
15	MY packing	1
16	Hexagon socket head bolt with washer	4

* The figure above shows solenoid valve mounted type SVB2A.
* SAB2A is not equipped with (13) pilot solenoid valve.
* Double-acting operation type SAB3A is not equipped with (13) pilot solenoid valve and (6) spring.

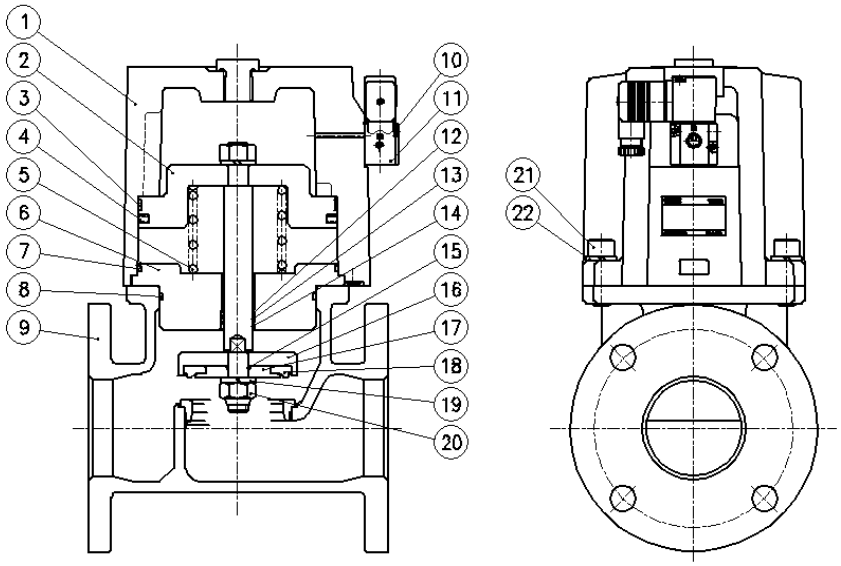
<Port size: 15A, 20A, 25A, 32A (F), 40A (F), 50A (F)>



No.	Part name	Quantity
1	Cylinder cover	1
2	Piston assembly	1
3	PSD packing	1
4	Spring	1
5	O-ring	1
6	Adaptor	1
7	O-ring	1
8	O-ring	1
9	MY packing	1
10	Cross recessed pan head screw with washer	2
11	Pilot solenoid valve	1
12	O-ring	1
13	Seat spacer	1
14	Main valve body	1
15	Spring washer	1
16	Lock nut	1
17	Body	1
18	Hexagon socket head bolt with washer	4

* The figure above shows solenoid valve mounted type SVB2A.
* SAB2A is not equipped with (11) pilot solenoid valve.
* Double-acting operation type SAB3A is not equipped with (11) pilot solenoid valve and (4) spring.
* For 32A to 50A, (19) hexagon socket head bolt with washer is a non-assembled type bolt (washer can be separated from the bolt).

<Port size: 65F, 80F>



No.	Part name	Quantity
1	Cylinder cover	1
2	Piston assembly	1
3	Wear ring	1
4	PSD packing	1
5	Spring	1
6	Adaptor	1
7	O-ring	1
8	O-ring	1
9	Body	1
10	Cross recessed pan head screw with washer	2
11	Pilot solenoid valve	1
12	O-ring	1
13	MY packing	1
14	Scraper	1
15	O-ring	1
16	Valve body	1
17	Seat spacer	1
18	Main valve body	1
19	Spring washer	1
20	Lock nut	1
21	Hexagon socket head bolt	4
22	Spring washer	4

* The figure above shows solenoid valve mounted type SVB2A.
* SAB2A is not equipped with (11) pilot solenoid valve.
* Double-acting operation type SAB3A is not equipped with (11) pilot solenoid valve and (5) spring.

2. INSTALLATION

2.1 Environment

⚠ WARNING

Consult CKD about the specifications before using the product outside the designated specifications or for special applications.

Prevent water and cutting oil from splashing onto the product directly.

- If water or cutting oil splashes onto the pilot solenoid valve directly, it may cause the coil to burn out.
- Although the product provided with a DIN terminal box has a degree of protection equivalent to IPX5, this does not guarantee a protection against continuous water splash. Protect the product by installing it under a cover or inside a paneled casing.
- When there is a possibility that the product is subjected to spatters of welding, take proper protective measures.

Consider measures for dissipating heat generated from a coil.
Appropriate ventilation or heat dissipation measures must be considered if the product is installed in a control board or if the solenoid coil needs to be energized for a long period.

Do not use the product in the presence of corrosive gas or solvents.
Do not use the product in an environment where corrosive gases such as sulfur dioxide gas or solvents are present.

Do not use the product in a humid environment.
Condensation may occur due to a change in the temperature.

Do not use an SVB Series valve in an explosive gas atmosphere.
The solenoid valve mounted type SVB Series valve cannot be used in an explosive gas atmosphere. For use in an explosive gas atmosphere, select an SAB Series valve and install an explosion-proof type solenoid valve in the pilot air circuit.

⚠ CAUTION

Take measures to prevent dusts from entering the valve.
In a dusty environment, install an elbow fitting facing down or a silencer to the pilot air exhaust port of the valve to prevent dusts from entering.

Use the product in an environment where it is not subject to radiant heat.

Do not paint the product or clean it with water or solvent.
The resin parts can become damaged and this may lead to a failure or malfunction.

- When using in a cold area, take proper measures against freezing.
- The product cannot be used outdoors. Protect the product by installing it inside a cover or a case.
- Do not use the product in an environment where the valve is subject to vibrations or inertia.

2.2 Unpacking

⚠ CAUTION

Do not remove the piping port protector and do not take the product out of the plastic bag until just before piping.
If the piping port protector is removed or the product is taken out of the plastic bag before ready to begin piping, foreign matters may enter from the piping ports and cause a failure or malfunction.

- Check that the model number ordered and the model number indicated on the product are the same.
- Check the exterior of the product for any damage.
- When storing the product, keep it packaged in the individual package box to prevent foreign matters from entering the valve. Take it out of the box when ready to begin piping.

2.3 Mounting

⚠ CAUTION

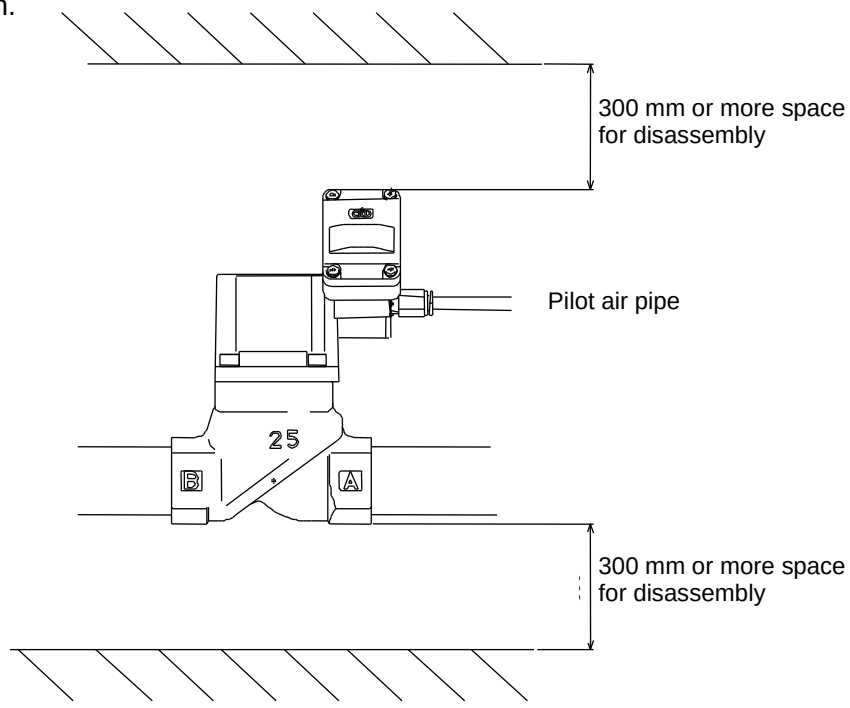
Thoroughly read and understand this Instruction Manual before mounting the product.

Hold the body firmly when handling and mounting the product.

Check for leakage from the pipes after mounting the product and confirm that the product has been mounted properly.

- There is no restriction on the mounting orientation.
  However, for the solenoid valve mounted type SVB Series valve, do not mount the product with the coil facing down. If the coil is mounted facing down, foreign matters in the fluid will adhere to the electromagnetic iron core and cause noise and operation faults.
- Secure sufficient space for working safely during maintenance and troubleshooting. (Refer to the figure below.)

1 Install piping by holding the width across flats section on the valve with a pipe wrench or an adjustable wrench.



2.4 Piping

⚠ CAUTION

Secure the product when tightening or piping again.

Secure and support the pipes to prevent the valve from being subjected to pipe loads and vibrations directly.

Do not apply high pressure suddenly when supplying fluid for the first time after connecting the pipes.

If the pipes are not secured properly, it may lead to accidents such as a pipe disconnection or a fluid leakage.

■ Pipe cleaning

Before piping, flush with air of more than 0.3 MPa to remove foreign matters such as dust, metal powder, rust, and seal tape.

■ Removal of foreign matters

Remove foreign matters such as dusts in the fluid to prevent causing an operation fault or leakage. When the fluid is air, install a filter (maximum allowable particle size is 5 μm) on the primary side of the valve.

■ Fluid supply port when piping

Pipe the body side supply ports and the pilot air side supply ports as indicated in the following table.

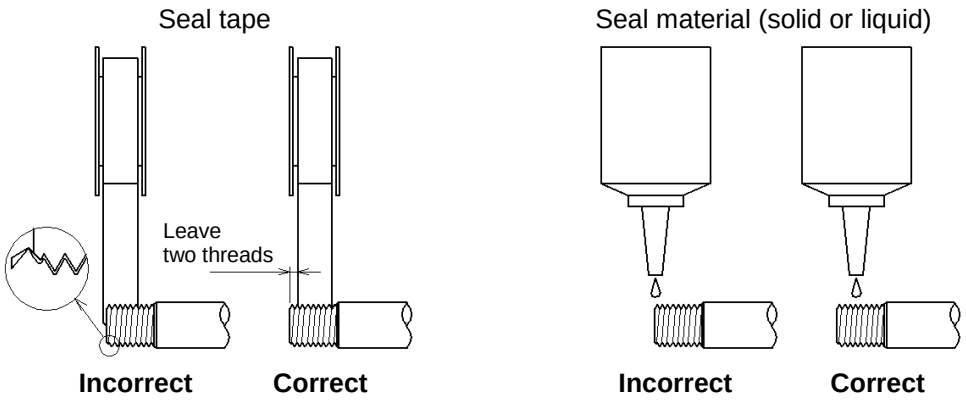
Supply ports for the body and the pilot air

Actuation	Body side supply port	Pilot air side supply port	
		SAB Series	SVB Series
Normally closed	B	X	P
Normally open	A	Y	P
Double-acting	A or B	X and Y	-

■ Seal material

Apply a seal tape or seal material to the screw threads leaving two or more threads at the pipe end uncovered or uncoated. If the pipe end is fully covered or coated, a shred of seal tape or residue of seal material may enter inside of the valve and cause a failure.

When using a seal tape, wind it around the screw threads in the direction opposite from the screw threads and press it down with your fingers to attach it firmly.
When using a liquid seal material, be careful not to apply it to resin parts. The resin parts can become damaged and this may lead to a failure or malfunction.
Also, do not apply seal material to the internal threads.



■ Tightening

- When piping to the valve, secure the body with a wrench or a vise.
- When using the solenoid valve mounted type SVB Series valve, do not connect a steel pipe directly to the pilot solenoid valve. The screws for mounting the solenoid valve may become damaged.
- For the pipe tightening torque, refer to the following tables.

Recommended tightening torque for pilot air port

Pipe port size	Recommended tightening torque (N·m)
Rc1/8	7 to 9

Recommended tightening torque for main port

Pipe port size	Recommended tightening torque (N·m)
Rc1/4	23 to 25
Rc3/8	31 to 33
Rc1/2	41 to 43
Rc3/4	62 to 65
Rc1	83 to 86
Rc1 1/4	97 to 100
Rc1 1/2	104 to 108
Rc2	132 to 136

■ Lubrication

This valve can also be used without lubrication. Although a lubricator is not required, when lubricating, use Class 1 ISO VG32 turbine oil (additive-free).
An operation fault may occur due to the loss of the initial lubricant if lubrication is not continued. Make sure to continue lubrication so as not to run out the lubricant.

■ Measures against drainage of pilot air

Compressed air contains a large amount of drainage such as water, oxidized oil, tar, and foreign matters. Such drainage may cause a significant reduction in the accuracy of the pneumatic component. Take measures against drainage (such as dehumidifying with an aftercooler or a dryer, removing foreign matters with an appropriate filter, or installing a tar removing filter) in order to improve the quality of air.

■ Prevention of entry of dusts

In a dusty environment, install a silencer or a filter to the exhaust port and the breathing hole of pilot air to prevent dusts from entering and causing an operation fault and fluid leakage.

2.5 Wiring

This section applies to solenoid valve mounted type SVB Series only.

⚠ WARNING

Thoroughly read and understand this Instruction Manual before working on electrical wiring.
The product must be handled by a person who understands the structure and operation principle of solenoid valve and has knowledge to secure the safety.

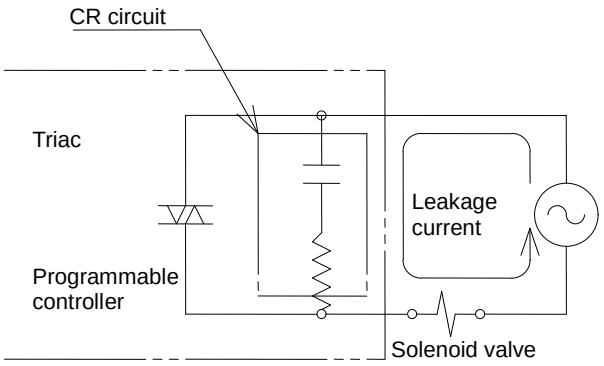
⚠ CAUTION

Check the power supply voltage and the current type (AC or DC).

Check for leakage currents from external control devices to prevent a malfunction.

- When using a control device such as a programmable controller, leakage currents from the control device may affect the solenoid valve and cause it to malfunction.
- When using the product, make sure that leakage currents from external control devices satisfy the condition shown in the following table.

Rated voltage	Leakage current
100 VAC	3.0 mA or less
200 VAC	1.5 mA or less
24 VDC	1.0 mA or less



Protection of electric facilities
In order to protect electric facilities, use a circuit breaker such as a fuse in the control circuit.

Wiring of the lead wire type
Use wires with a nominal cross-sectional area of approximately 0.5 mm^2 or more.
In addition, do not subject the lead wires to an excessive force.
The SVB series valve does not have a polarity of (+) or (-) even when the rated voltage of the solenoid valve is DC voltage.

2.5.1 How to wire the DIN terminal box

This section applies to products with DIN terminal box (coil option symbol "2G" or "2H").

Use a cabtyre cord with an outside diameter of ø4.5 to ø7 and a nominal cross-sectional area of 0.75 mm^2 or more.

1 Strip the lead wire of the cabtyre cord.

2 Insert the cabtyre cord into the cap, washer, gasket and case.

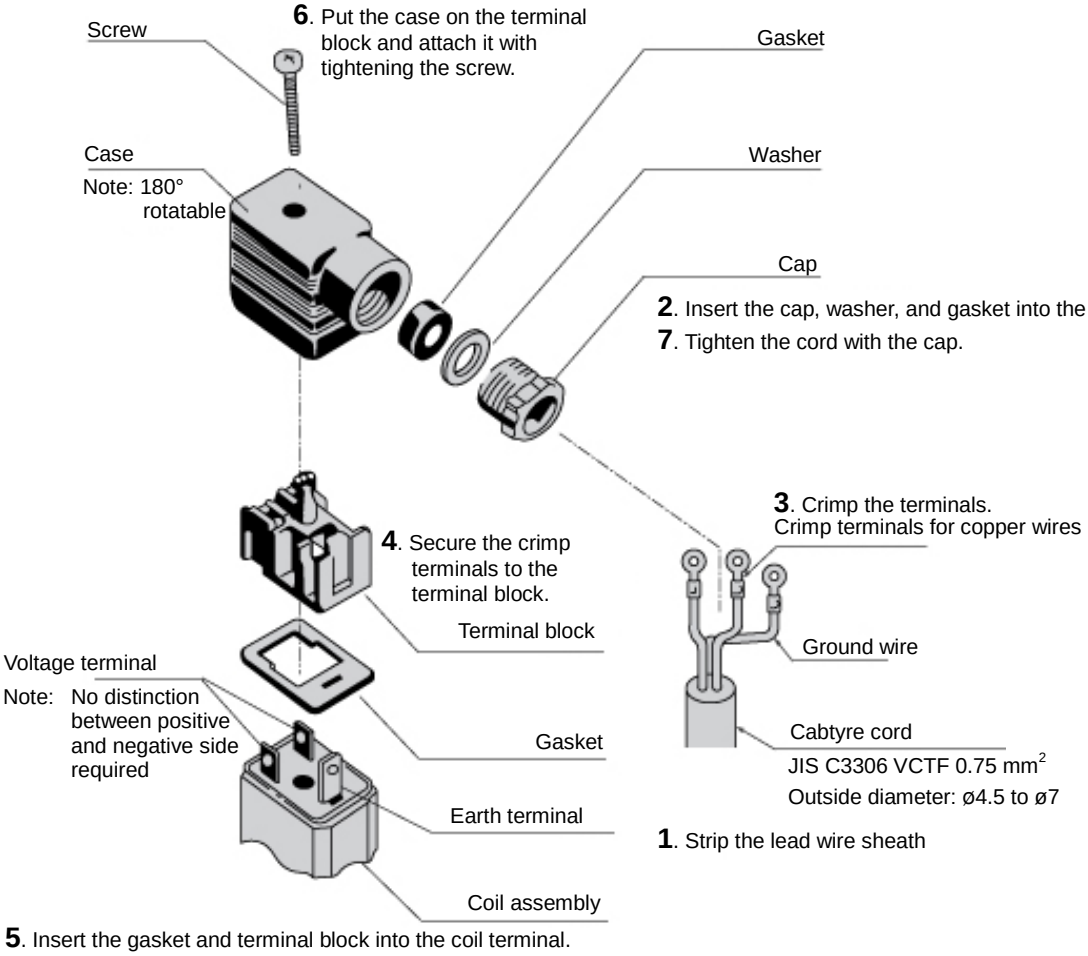
3 Insert the crimp terminals for copper wires into the lead wire of the cabtyre cord and crimp the terminals.

4 Put the crimp terminals for the lead wire on the terminal block and secure the crimp terminals with a screw with a tightening torque of 0.5 N·m.
Connect the ground wire to the earth terminal for the terminal block.

5 Insert the gasket and the terminal block into the coil assembly.

6 Put the case on the terminal block and secure a screw with a tightening torque of 0.5 N·m.
When changing the outlet direction of the cord, take the terminal block out of the case, turn it by 180° and put it into the case.

7 Tighten the cap to the case and secure the cord.



Perform wiring according to steps 1 to 7 above.

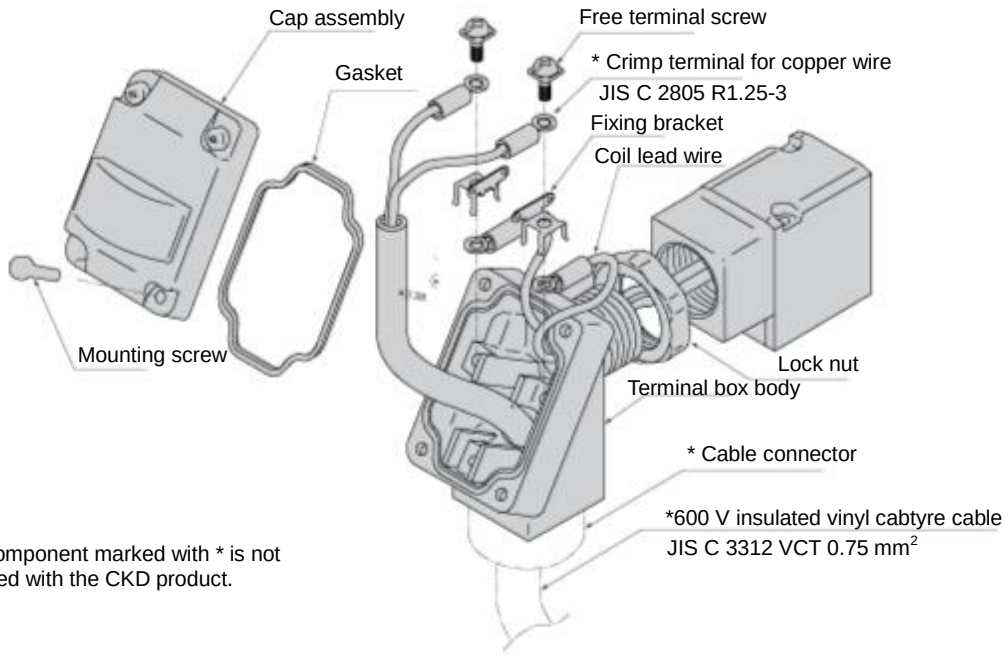
Wiring of DIN terminal box

2.5.2 How to wire the T-type terminal box

This section applies to products with T-type terminal box (coil option symbol "3T" or "3R").

Use a cabtyre cord with a nominal cross-sectional area of 0.75 mm^2 to 1.5 mm^2.

1. Pass the cabtyre cord through the terminal box body.
2. Insert the crimp terminals for copper wires into the lead wire of the cabtyre cord and crimp the terminals.
3. Insert each free terminal screw into the crimp terminal, fixing bracket, and the terminal of the coil lead wire in this order and tighten them with a tightening torque of 0.5 N·m.
4. Attach the gasket and the cap assembly and tighten the mounting screws with a tightening torque of 0.5 N·m.



The component marked with * is not included with the CKD product.

Wiring of T-type terminal box

2.5.3 How to change the orientation of the T-type terminal box

In order to change the orientation of the T-type terminal box, follow the procedure shown below:

1. Grip the width across flats section (width: 25) on the terminal box body with a wrench and loosen the terminal box by turning it counterclockwise by a 1/2 turn.
2. Loosen the lock nut.
3. Turn the T-type terminal box in the tightening direction (clockwise) to approximately 15° from the desired orientation.
   When turning the T-type terminal box clockwise from the factory setting orientation, do not turn it by more than a 1/2 turn.
4. Lightly tighten the lock nut toward the coil by hand.
5. Grip the width across flats section on the terminal box body with a wrench and tighten the terminal box by turning it to the desired orientation by approximately 15°.

3. USAGE

⚠ WARNING

Do not use the product as a valve for ensuring safety such as an emergency shut-off valve.
The product is not designed to be used as a valve for ensuring safety such as an emergency shut-off valve. If using the product for such a system, take appropriate measures in advance to secure safety.

Take necessary measures for preventing people and properties from being affected by a failure of the product.

Do not use fluids other than those specified in the Specifications.
Check the compatibility with the working fluid by referring to the checklist of control fluids in the catalog.
If the quality of the working fluid is poor, for example, if it contains fine particles, sludge, and foreign matters, the durability of the rod packing will decrease significantly. If the sealing performance of the rod packing is lost, the fluid may leak into the cylinder, flow backward through the pilot air piping, and damage the device in the air circuit. Perform maintenance periodically or take proper measures.
Grease has been applied to the piston rod sealing section of the cylinder valve. Make sure that the system will not be affected by grease that may be mixed into the working fluid.

Do not touch the coil and the actuator while the product is energized.
A burn injury may occur.

Do not touch electrical wiring connections (bare live parts) while the product is energized.
An electric shock may occur.

⚠ CAUTION

Use the product within the specified pressure range.

3.1 Checks to Make Before Use (Checks Made After Mounting)

⚠ WARNING

Close the main cock and discharge the fluid in the valve before performing an appearance check.

Turn off the power before checking the power and insulation resistance.
Be careful not to get an electric shock while checking.

■ Appearance check

- Check that the valve is securely fixed to the piping by pressing it by hand.
- Check that the threaded parts such as bolts, nuts, and screws are not loose.

■ Leakage check

- Pressurize the pilot air to check for leakage from the piping connection.
- Pressurize the fluid to check for leakage from the piping connection.
- It is recommended to check for leakage by supplying compressed air (0.3 MPa to 0.5 MPa) and applying soapy water to see if bubbles form.

■ Electricity check

- Check the power supply voltage.
  Keep the voltage fluctuations within ± 10% of the rated voltage range.
  If the product is used beyond the voltage fluctuation range, an operation fault or damage to the coil may occur.

- Check the insulation resistance.
  Measure the insulation resistance between a non-live metal part mounted to the solenoid valve and a bare live part such as a lead wire.
  Check that the insulation resistance is 100 MΩ or more with 500 VDC megger.

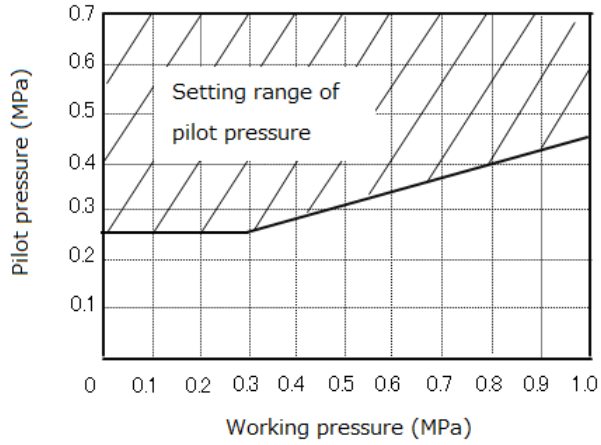
■ Operation check

- Apply the rated voltage and pressurize the working fluid to check if the solenoid valve performs opening and closing movement properly.
  When the energization time for the pilot solenoid valve is short, the cylinder valve may not be able to follow and operate.
  Check the operation frequency described in "3.2 Safety Instructions."

3.2 Safety Instructions

- Do not hold the solenoid valve when carrying the product.
  Do not carry the product by holding the lead wires and cables connected to the terminal box.
- Do not stand or put a heavy object on the solenoid valve.
- When the product has not been used for three days or more, the initial response time may be delayed for about a second. Perform a trial run before starting operation.
- Set the pilot pressure so that it is within the specified range.
  Especially for the normally open type (SAB2A, SVB2A) and double-acting operation type (SAB3A), set the pilot pressure as shown in the following graph.
  If the product is used beyond the setting range of the pilot pressure, a sealing failure will occur.
  When the pilot pressure cannot be controlled, it is recommended to select one of the models of the normally closed type (SAB1A, SVB1A).

Graph of relationship between the pilot pressure and the working fluid pressure
(For SAB2A, SAB3A, and SVB2A Series)



- When a manifold solenoid valve is used for pilot operation of an SAB Series valve, the exhaust pressure will flow in from other valves and may cause a malfunction. For example, the SAB Series valve may open for an instant.
  When using a manifold solenoid valve, employ a solenoid valve with an integrated "exhaust malfunction prevention valve". The 4G Series 3, 5-port pneumatic solenoid valve manufactured by CKD is recommended.
  Also, since a similar phenomenon occurs when the exhaust flows in from the exhaust (R) port of the SVB Series valve, do not connect the exhaust (R) port to an exhaust circuit where a back pressure may occur.
- Observe the operation frequency. For information on the operation frequency, refer to the following table.

Operation frequency

Port size	Operation frequency
8A, 10A, 15A, 20A, 25A	30 times/min or less
32A (F), 40A (F)	20 times/min or less
50A (F)	15 times/min or less
65F	10 times/min or less
80F	6 times/min or less

- When the energization time for the pilot solenoid valve is short, the cylinder valve may not be able to follow and operate.
- In order to muffle the exhaust sound from the pilot solenoid valve of an SVB Series valve, install a silencer (port size: M5) to the exhaust port of the pilot solenoid valve.
- For an application where the temperature of the fluid is high, use an SAB Series valve and select fluoro rubber for the sealing material.
- When an abnormality is found, refer to "5 TROUBLESHOOTING".

3.3 Manual Operation

⚠ CAUTION

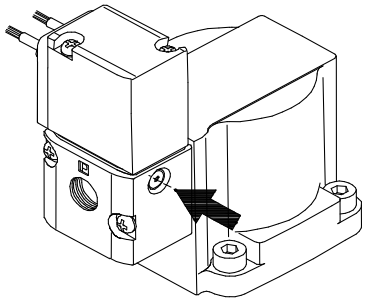
Make sure that the manual shaft has returned to the original position after performing manual operation.

<Manual operation method for the non-locking type (SVB1A, SVB2A)>

1 Supply an air pressure that is within the specified range to the pilot port.

2 Push the manual shaft until it stops.
While the manual shaft is pushed, the valve is in the same state as being energized and operated.
The valve returns to the original position by releasing the manual shaft.

3 Check that the manual shaft has returned to the original position.



The valve operates while pushing the manual shaft.

4. MAINTENANCE AND INSPECTION

⚠ WARNING

Thoroughly read and understand this Instruction Manual before maintenance and inspection.

4.1 Maintenance Parts

■ Pilot solenoid valve

Replace the pilot solenoid valve when an abnormality such as an electric failure, leakage, and delay in the operation is found.
Replace the pilot solenoid valve when the operation count reaches approximately 5 million times.

■ Packing, O-ring, main valve body

Replace the packing, O-ring, and main valve body when an abnormality such as leakage, sticking of the valve, and delay in the operation is found while using the product.
Replace the whole product when the operation count of the valve reaches the value shown in the following table.

Valve operation count

Port size	Operation count
8A to 25A	Approx. 3 million times
32A (F) to 50A (F)	Approx. 2 million times
65F, 80F	Approx. 1 million times

4.2 Periodic Inspection

- In order to use the product under optimum conditions, perform a periodic inspection every six months.
- For details on inspection, refer to "3.1 Checks to Make Before Use (Checks Made After Mounting)" in this Instruction Manual.
- Be careful not to clog the strainer and filter.

4.3 Disassembling and Assembling

⚠ WARNING

Close the main cock and discharge the fluid in the valve before disassembling.

Turn off the power before disassembling and assembling.
An electric shock may occur.

Be careful not to let the springs pop out when disassembling.
An injury may occur.

- A spring is contained in the cylinder cover (S☐B1A, S☐B2A). Refer to "1.2 Internal Structure".
- For the normally closed type (SAB1A, SVB1A) of the port size 15A to 50A (F), a C-type stop ring is used to prevent the spring from popping out. Do not remove the C-type stop ring.
- For the normally closed type (SAB1A, SVB1A) of the port size 65F and 80F, a bolt at the center section of the cylinder cover is used to prevent the spring from popping out. Do not remove the bolt at the center section.

Faults caused by disassembly or replacement of the product or parts are not covered by the warranty.

4.3.1 Disassembling

1. Remove four hexagon socket head bolts securing the cylinder cover assembly.
2. Remove dirt and foreign matters adhering to the screw threads at the left end of the piston assembly.
3. Apply lubricant to the gap between the lock nut and the assembly screw threads.
   When reusing the main valve body, be careful not to apply lubricant to the main valve body.
4. Hold the piston assembly with a wrench, put the wrench on the lock nut perpendicularly and turn it gradually and carefully.
   Since there is a possibility of the lock nut becoming jammed with the threads, turn the lock nut carefully. If the screw threads of the piston assembly are damaged, the piston assembly cannot be reused. Replace the piston assembly with a new one included in a kit.

■ When cleaning parts

Use cleaning liquid with less environmental impact such as a neutral detergent. Do not use organic solvents as they may swell or deteriorate rubber parts and resin parts. Replace rubber parts if they are significantly dirty or deteriorated.

4.3.2 Assembling

1. Apply grease to the packing and the O-ring.
2. Also apply grease to the surfaces on which the packing slides, such as the inside surface of the cylinder cover and the piston rod.
   Silicon grease is recommended.
3. Attach the packing in correct orientation.
4. Assemble all parts.
   Tighten the threaded parts with the tightening torque shown in the following tables.

Recommended tightening torque for lock nut for tightening the piston rod

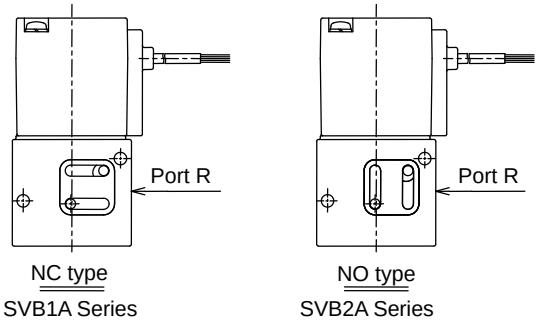
Port size	Screw size	Recommended tightening torque (N·m)
8A, 10A	M4	1.3 to 1.7
15A, 20A		
25A		
32A (F)	M5	2.7 to 3.3
40A (F), 50A (F)	M6	4.6 to 5.8
65F, 80F	M14	90 to 110

Recommended tightening torque for hexagon socket head bolt for tightening the body

Port size	Screw size	Recommended tightening torque (N·m)
8A, 10A	M3	2.3 to 2.7
15A, 20A	M4	3.0 to 4.0
25A	M5	6.0 to 8.0
32A (F)	M6	10 to 14
40A (F), 50A (F)	M8	26 to 33
65F, 80F	M12	90 to 110

■ When mounting a pilot solenoid valve

1 Mount the solenoid valve after confirming the direction of the gasket between the pilot solenoid valve and the cylinder cover.
Since the direction of the gasket is different between the normally closed type (NC) and the normally open type (NO), be careful when mounting the gasket.



Mounting direction of the pilot solenoid valve gasket

2 Tighten the cross recessed pan head screw with the tightening torque of 0.46 N·m to 0.75 N·m and secure the pilot solenoid valve to the cylinder cover.

5. TROUBLESHOOTING

5.1 Problems, Causes, and Solutions

If the product does not operate as intended, check the table below for a possible solution.

Problem	Cause	Solution
Valve does not operate.	Valve is not energized.	Check the wiring, fuse, etc. and turn on the power.
	Applied voltage is lower than voltage fluctuation range.	Check the power and input the rated voltage.
	Fluid pressure is too high.	Adjust it so that it is within the specified range.
	Pilot pressure is too low.	Adjust it so that it is within the specified range.
	Pilot solenoid valve does not operate.	Replace the pilot solenoid valve.
	Foreign matters are stuck in piston rod.	Disassemble the valve and clean its inside.
Valve does not return.	Pressurizing port of body is mounted in reverse direction.	Refer to this Instruction Manual to correct the pressurizing port.
	Power is not turned off.	Check for leakage current and correct the circuit to make sure that the power turns off properly.
	Pilot solenoid valve does not return.	Replace the pilot solenoid valve.
	Foreign matters are stuck in piston rod.	Disassemble the valve and clean its inside.
	Grease on packing has run out.	Disassemble the valve, clean its inside and apply grease to it.
There is external leakage.	There are abrasions and scratches on packing and O-ring.	Disassemble the valve to replace the packing and the O-ring.
	Screws and bolts are loose.	Tighten the screws and the bolts.
There is internal leakage.	There are abrasions and scratches on valve seat of body.	Replace the product.
	There are abrasions and scratches on sealing surface of main valve body.	Replace the main valve body.
	Foreign matters are stuck in main valve body.	Disassemble the valve and clean its inside.

If you have any other questions or concerns, contact your nearest CKD sales office or distributor.

6. WARRANTY PROVISIONS

6.1 Warranty Conditions

■ Warranty coverage

If the product specified herein fails for reasons attributable to CKD within the warranty period specified below, CKD will promptly provide a replacement for the faulty product or a part thereof or repair the faulty product at one of CKD's facilities free of charge.
However, following failures are excluded from this warranty:

- Failure caused by handling or use of the product under conditions and in environments not conforming to those stated in the catalog, the Specifications, or this Instruction Manual.
- Failure caused by incorrect use such as careless handling or improper management.
- Failure not caused by the product.
- Failure caused by use not intended for the product.
- Failure caused by modifications/alterations or repairs not carried out by CKD.
- Failure that could have been avoided if the customer's machinery or device, into which the product is incorporated, had functions and structures generally provided in the industry.
- Failure caused by reasons unforeseen at the level of technology available at the time of delivery.
- Failure caused by acts of nature and disasters beyond control of CKD.

The warranty stated herein covers only the delivered product itself. Any loss or damage induced by failure of the delivered product is excluded from this warranty.

■ Confirmation of product compatibility

It is the responsibility of the customer to confirm compatibility of the product with any system, machinery, or device used by the customer.

■ Others

The terms and conditions of this warranty stipulate basic matters.
When the terms and conditions of the warranty described in individual specification drawings or the Specifications are different from those of this warranty, the specification drawings or the Specifications shall have a higher priority.

6.2 Warranty Period

The product is warranted for one (1) year from the date of delivery to the location specified by the customer.