CKD

SM－9272－A

INSTRUCTION MANUAL

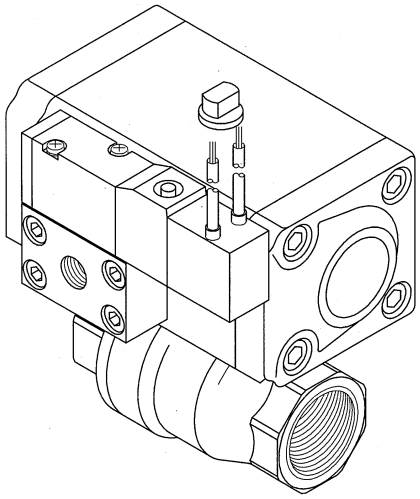
AIR OPERATED

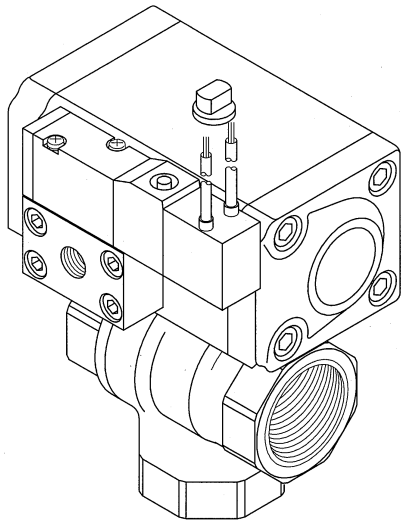
BALL VALVE

CHB Series with solenoid valve

CHBF Series with solenoid valve

CHG Series with solenoid valve





- Please read this instruction manual carefully before using this product, particularly the section describing safety.
- Retain this instruction manual with the product for further consultation whenever necessary.

Ver.5

CKD Corporation

Safety precautions

When designing and manufacturing a device using CKD products, the manufacturer is obligated to manufacture a safe product by confirming safety of the system comprising the following items:

■ Device mechanism
■ Pneumatic or water control circuit
■ Electric control that controls the above

It is important to select, use, handle, and maintain the product appropriately to ensure that the CKD product is used safely.
Observe warnings and precautions to ensure device safety.
Check that device safety is ensured, and manufacture a safe device.

⚠ WARNING

1. This product is designed and manufactured as a general industrial machine part. It must be handled by someone having sufficient knowledge and experience.

2. Use this product within its specifications.

Consult with CKD for details when using the product beyond the unique specification range, outdoors, or in the following conditions or environment: Additionally, the product must not be modified or machined.

① Use for special applications requiring safety including nuclear energy, railroad, aviation, ship, vehicle, medical equipment, equipment or applications coming into contact with beverage or food, amusement equipment, emergency shutoff circuits, press machine, brake circuits, or for safeguard.
② Use for applications where life or assets could be adversely affected, and special safety measures are required.

3. Observe corporate standards and regulations, etc., related to the safety of device design and control, etc.

ISO4414, JIS B 8370 (pneumatic system rules)
JFPS2008(principles for pneumatic cylinder selection and use)
Including High Pressure Gas Maintenance Law, Occupational Safety and Sanitation Laws, other safety rules, body standards and regulations, etc.

4. Do not handle, pipe, or remove devices before confirming safety.

① Inspect and service the machine and devices after confirming safety of the entire system related to this product.
② Note that there may be hot or charged sections even after operation is stopped.
③ When inspecting or servicing the device, turn off the energy source (air supply or water supply), and turn off power to the facility. Discharge any compressed air from the system, and pay enough attention to possible water leakage and leakage of electricity.
④ When starting or restarting a machine or device that incorporates pneumatic components, make sure that the system safety, such as pop-out prevention measures, is secured.

5. Observe warnings and cautions on the pages below to prevent accidents.

■ **The safety cautions are ranked as "DANGER", "WARNING" and "CAUTION" in this section.**

DANGER : When a dangerous situation may occur if handling is mistaken leading to fatal or serious injuries, or when there is a high degree of emergency to a warning.

WARNING : When a dangerous situation may occur if handling is mistaken leading to fatal or serious injuries.

CAUTION : When a dangerous situation may occur if handling is mistaken leading to minor injuries or physical damage.

Note that some items described as "CAUTION" may lead to serious results depending on the situation. In any case, important information that must be observed is explained.

Precautions with regard to guarantee

● Guarantee period

The guarantee period of our product shall be one (1) year after it is delivered to the place specified by the customer.

● Guarantee coverage

If any failure for which CKD CORPORATION is recognized to be responsible occurs within the above warranty period, a substitute or necessary replacement parts shall be provided free of charge, or the product shall be repaired free of charge at the plant of CKD CORPORATION.

However, the guarantee excludes following cases:

① Defects resulting from operation under conditions beyond those stated in the catalogue or specifications.
② Failure resulting from malfunction of the equipment and/or machine manufactured by other companies.
③ Failure resulting from wrong use of the product.
④ Failure resulting from modification or repairing that CKD CORPORATION is not involved in.
⑤ Failure resulting from causes that could not be foreseen by the technology available at the time of delivery.
⑥ Failure resulting from disaster that CKD is not responsible of.

Guarantee stated here covers only the delivered products. Any other damage resulting from failure of the delivered products is not covered by this guarantee.

● Confirmation of product compatibility

Our customer shall be responsible of confirming compatibility of our product used in our customer's system, machinery or device.

【 Contents 】

1. Unpacking

⚠ CAUTION	Do not remove the packing bag until just before piping work. Otherwise, foreign matter enters from the port and cause malfunction or bad operation.

(1) Check that the model No. shown on the face plate of the product is the same with what you ordered.

(2) Check that the product has no external damages.

(3) When storing the product, attach a sealing plug to prevent the intrusion of foreign matter to the valve. Remove the sealing plug when piping the valve.

2. Installation

⚠ WARNING	Contact CKD if the product is to be used beyond specifications, or in special applications.

2.1 Conditions for installation

⚠ WARNING	a) If there are high levels of dust in the area, provide protection by installing a silencer or an elbow joint facing downward onto the exhaust port so that dust does not enter. b) Do not use this product in an environment in which corrosive gases could encroach the configuration materials. c) Install this product at a place not subject to vibration. d) Avoid humid environments, since condensation may occur with change in temperature. e) The coils will produce heat. Particularly if the solenoid valve system is installed in a control board or if the solenoid coils need to be energized for a long time, consider providing sufficient ventilation to release the heat. The coils can get very hot. f) Where the ozone content is high, packing and gasket will degrade fast. Such places include the following: near seashore, or where lightning strikes often. g) The solenoid valve mounted type must not be used outdoors. Take appropriate measures to guard the valve if it may be subject to water drip or oil, etc.

(1) When using the valve in a cold district, an proper provision is required to prevent freezing of the valve.

(2) The solenoid valve mounted type cannot be used in an explosive gas atmosphere. To use in a explosive gas atmosphere, install an explosion proof solenoid valve on the pilot air circuit of the CHB, CHBF, CHG, CHB-R, CHBF-R or CHG-R series.

2.2 Installation method

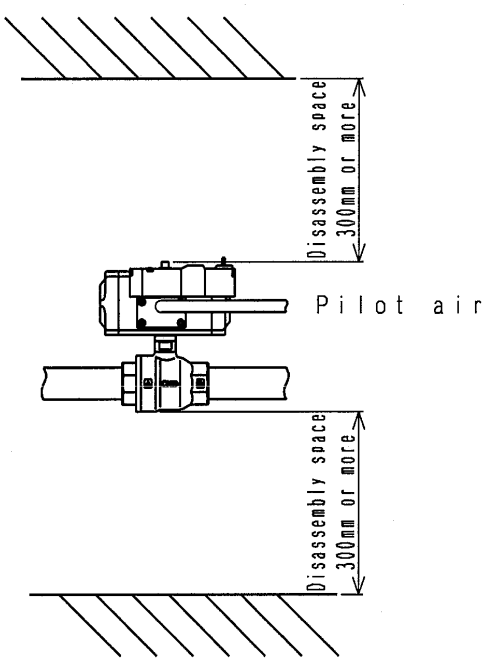
2.2.1 Installation

⚠ CAUTION	a) Always thoroughly read the Instruction Manual before installing this product. b) Always hold the body when handling or installing the product. c) After installing, check for leak from the pipe and make sure that the product is correctly installed.

(1) The installation posture of the valve is not restricted.

2.2.2 Space for maintenance

・ An adequate space shall be provided around the valve to assure the safety during the maintenance / troubleshooting work.



(Figure 2.1)

2.3 Piping method

⚠ CAUTION	a) Fix the product when tightening or reinstalling the piping. When piping to the body side, fix the body, and when piping to the cap side, fix the cap. b) Fix and support the pipes so that the weight and vibration of the pipes are not directly applied on the valves. c) Torque required to tightening pipes are shown in Table 2.2, 2.3 for reference. d) Do not plug the EXH port. Otherwise, pilot pressure cannot be released and the valve does not operate.

(1) Cleaning of piping

・ Before piping, flush the inside of the pipe with 0.3MPa air, and remove any foreign matter, metal powder, rust and sealing tape, etc.

(2) Removal of foreign matter

・ Any dirt or foreign matter in the fluid can prevent the product from functioning correctly. Install an 80 mesh strainer when passing water, and a 5 μ or less filter when passing air.

(3) Piping

・ When piping, pipe the ball valve side and the supply port side of pilot air as shown in Table 2.1.

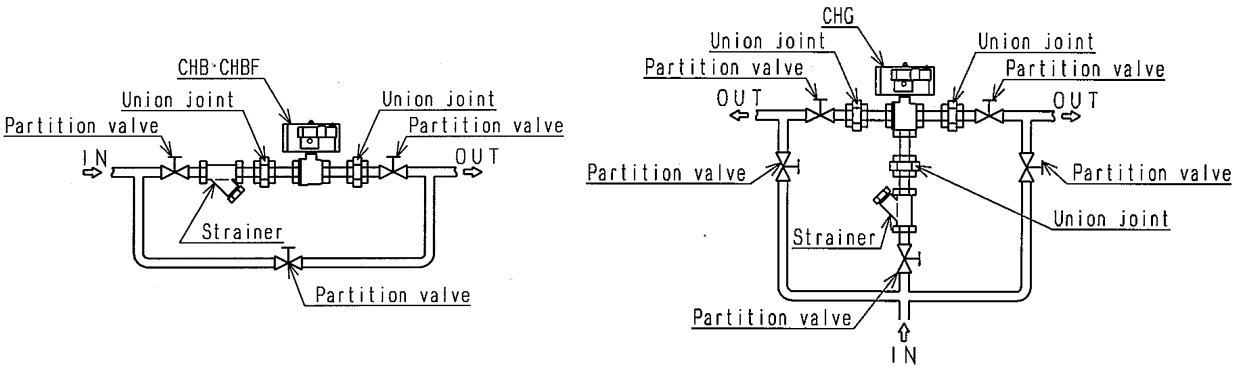
・ Fix the valve by piping support of the ball valve part.

・ When controlling the fluid in a tank, pipe at a level slightly above the bottom of the tank.

Table 2.1 Supply port

Actuation	Ball valve side supply port	Pilot air supply port
2port valve double acting	A or B	P
2port valve single acting	A or B	P
3port valve double acting	C	P
3port valve single acting	C	P

The following figure describes recommended piping methods.
Piping recommends the example of the following figure.

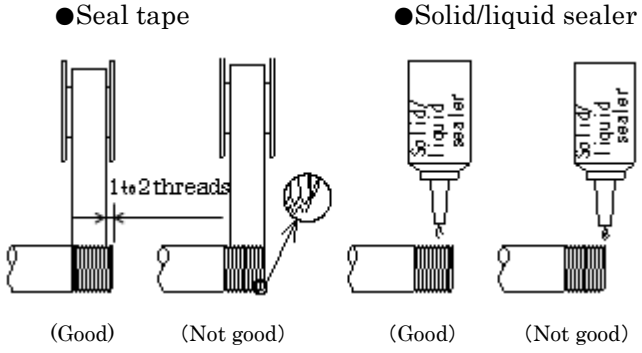


(Figure 2.2)

In order to make maintenance check easy to carry out, a union joint or a flange joint should be used, as well as installation of a bypass.

(4) sealer

・ The sealer shall be used with great care to prevent it from entering the pipes or causing external leakage.
When taping a threaded portion, 1 to 2 threads at the end of the portion shall be exposed. (Figure 2.3) When using liquid sealer, take care not to apply too much sealer. Similarly to the case of taping, threads at the end of the threaded portion shall be exposed.
Do not apply to the female screw of the product.



(Figure 2.3)

(5) torque

·Torque required to tightening pipes are shown in Table 2.2, 2.3 for reference.

Table 2.2. Pilot port recommended torque

Port size	Torque for tightening pipe
R c 1 / 8	7 to 9 [N·m]

Table2.3. Main port recommended torque

Port size	Torque for tightening pipe
Rc3 / 8	31 to 33 [N·m]
Rc1 / 2	41 to 43 [N·m]
Rc3 / 4	62 to 65 [N·m]
Rc1	83 to 86 [N·m]
Rc1 1/4	97 to 100 [N·m]
Rc1 1/2	104 to 108 [N·m]
Rc2	132 to 136 [N·m]

(6) Lubricated or non-lubricated operation

- This series is used with pre-lubricated specifications, so no lubricator is required. Once lubrication is started, however, lubricate continuously to avoid using up lubricator. When lubricating, use the turbine Class 1/ISO VG32 (#90) or the equivalent.

(7) Provision for drain

- The compressed air contains high levels of drain (water, oxidized oil, tar, foreign matter) which can cause the reliability of the pneumatic components to drop remarkably. Improve the quality of the air (create clean air) by removing moisture with an after cooler or dryer, by removing the foreign matter with a filter, and by removing the tar with a tar removal filter, etc.

(8) Solenoid valve for pilot operation

- A 4-port valve (4KB119 made by CKD) is used as a solenoid valve for pilot operation.
  Follow the specifications and usage of the valve when using the solenoid valve.
  (Refer to the catalog “Pneumatic Valve” for details)

2.4 Wiring method of the solenoid valve

⚠ CAUTION

a) Confirm the voltage and the alternating or direct current type.

b) Permissible limit of leaked current

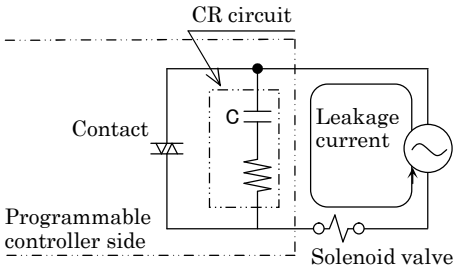
- When operating the solenoid valve using a programmable controller or equivalent, ensure that the leaked current from the output line of the programmable controller will not exceed the following level.

The leaked current may lead to a malfunction,(Figure 2.4)

Leak current：3.0mA or less for the rated voltage AC100V

Leak current：1.5mA or less for the rated voltage AC200V

Leak current：1.8mA or less for the rated voltage DC24V



(Figure 2.4)

(1) Polarity of the solenoid valve
The valve does not have positive and negative terminals although it is designed for use with a direct current.
It will not have polarity even if it is used with a lamp and/or a surge-absorber.

(2) Continuous power supply
When the solenoid valve is installed on a control panel or energized for an extended period, it will be heated to a temperature of 40-60℃. In this case, a provision is required to discharge heat, i.e. ventilation.

(3) Surge in the electric circuit
In case your electric circuits hesitate the surge of solenoid, it is recommended to use our surge-absorber provided valve or put a surge-absorber in parallel to the solenoid.

(4) The preservation of the electric facilities
Because of the preservation of the electric facilities, use breakers such as the fuse for the side of the control circuit.

(5) When using the small terminal box and water-proof is required use cab-tire cords φ4 to 6.5 in outer diameter (water-resistance is improved, but not for outdoor use)

(6) The connector type (C, C2, D, D2) should be used in a place with little dust and not directly exposed to water and oil.

(7) For the electrical circuit, use a switching circuit free of chattering.

(8) Be sure that the operation voltage is within 10% of the rated voltage.

⚠ CAUTION

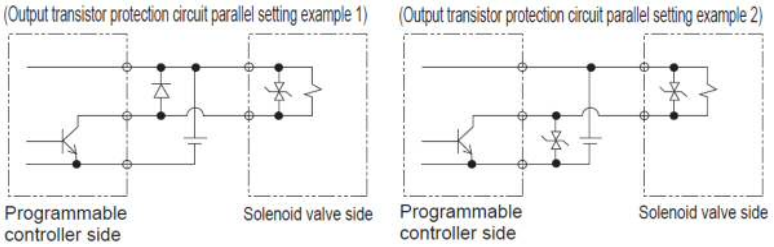
The surge suppressor enclosed with the solenoid valve is to protect the output contact for that solenoid valve's drive. There is no significant protection for other devices in the area, and the surge may cause damage or malfunctions. Surge generated by other devices could be absorbed and cause damage such as burning. Note the followings when selecting the type with built-in surge suppressor (coil option: L, C2, D2).

a) The surge suppressor limits solenoid valve surge voltage, which can reach several hundred volts, to a lower voltage level with standable by the output contact. Depending on the output circuit used, this may be insufficient and could result in damage or malfunction. Check whether the surge suppressor can be used by the surge voltage limit of the solenoid valve in use, the output device's withstand pressure and circuit structure, and by the degree of return delay time.

If necessary, provide other surge measures. Solenoid valves with surge suppressors suppress the reverse voltage surge generated during OFF operation to the levels below.

Rated voltage	Reverse voltage value when OFF
12 VDC	around 27 V
24 VDC	around 47 V

b) When using the NPN output unit, a surge voltage equivalent to the voltage above plus the power voltage surge could be applied. Provide contact protection circuit.



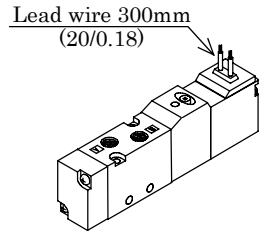
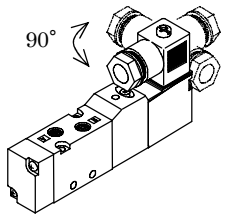
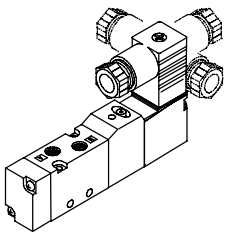
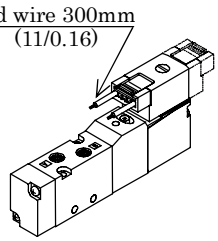
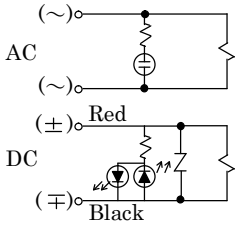
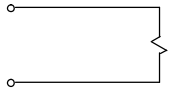
c) If another device or solenoid valve is connected in parallel to the solenoid valve, the inverse voltage surge generated when the valve is OFF would apply to those devices. Even when using the solenoid valve with surge suppressor for 24 VDC, the surge voltage may reach minus several ten V depending on the model. This inverse polarity voltage could damage or cause the other devices connected in parallel to malfunction. Avoid parallel connection of devices suspected of reversing polarity voltages, e.g., LED indicators.

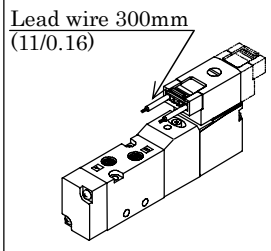
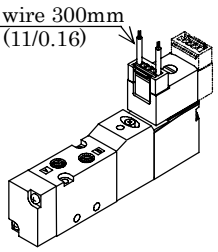
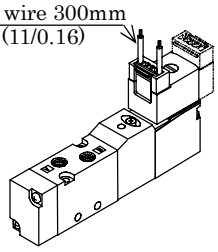
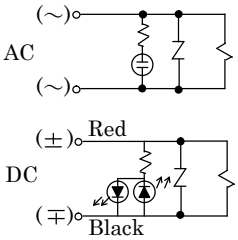
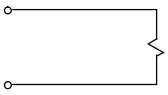
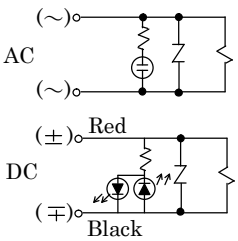
When driving several solenoid valves in parallel, the surge from other solenoid valves could enter the surge suppressor of one solenoid valve with a surge suppressor. Depending on the current value, that surge suppressor could burn.

Even if the solenoid valve type is the same, the surge suppressor's limit voltage can be inconsistent, and in the worst case, could result in burning. Avoid parallel drive of a solenoid valve of plurality.

	d) The surge suppressor incorporated in the solenoid valve often short circuits if damaged by overvoltage or overcurrent from a source other than the solenoid valve. If the surge suppressor fails, if a large current flows when output is on, the output circuit or solenoid valve could be damaged or ignite. Do not keep power on in a faulty state. Provide an overcurrent protection circuit on the power or drive circuit or use a power supply with overcurrent protection so that a large current does not flow continuously.

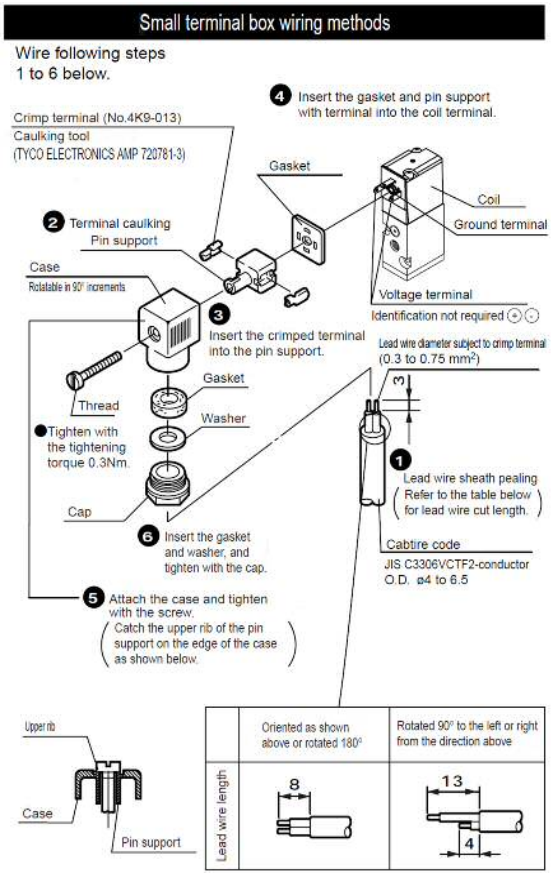
2.4.1 Electric wire connection

Name	Grommet (standard)	Small terminal box	Small terminal box with lamp	Plug-in connector C type with lead wire
Option code	No code	B	L	C
Shape				
Circuit			 Note. DC is with surge absorber.	

Name	Plug-in connector C type with lead wire, lamp surge absorber	Plug-in connector D type with lead wire	Plug-in connector D type with lead wire, lamp surge absorber
Option code	C2	D	D2
Shape			
Circuit			

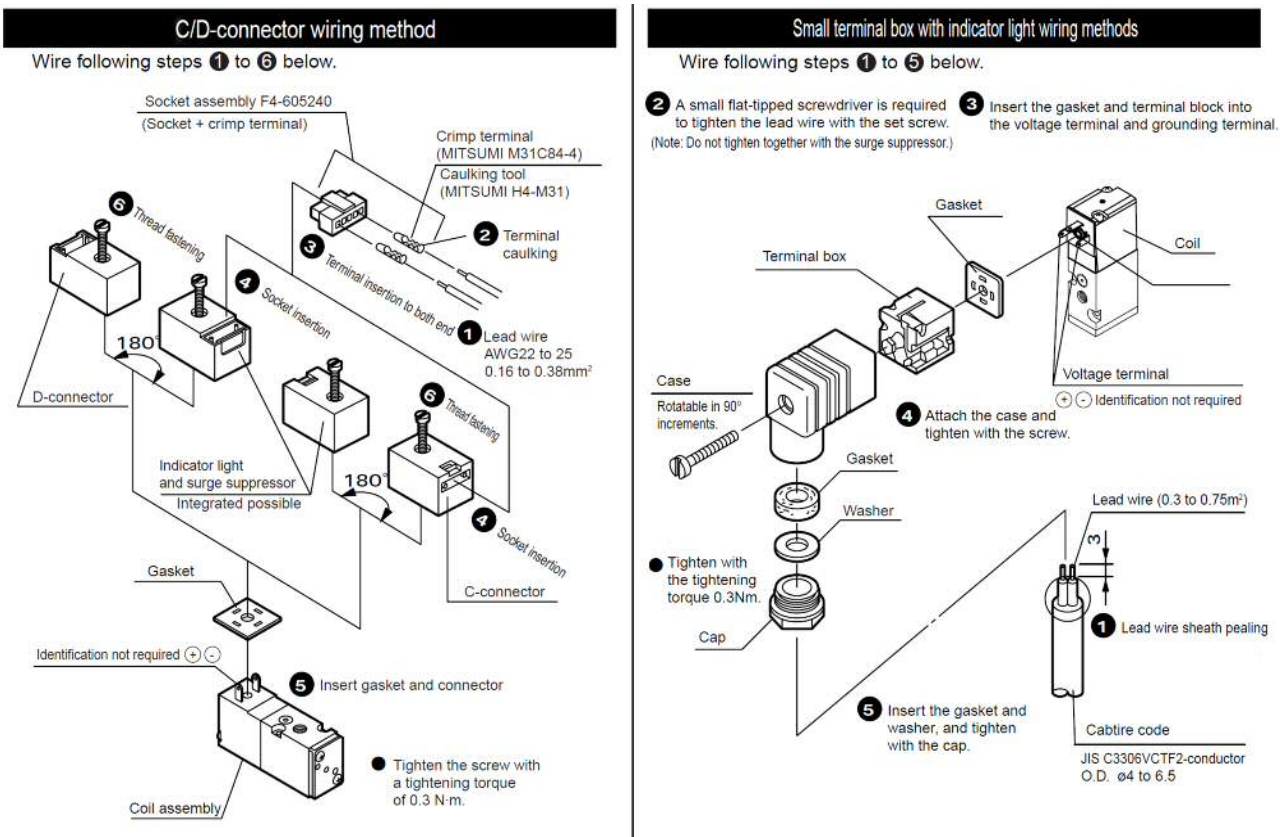
(Figure 2.5)

2.4.2 Wiring of the small terminal box (B)



(Figure 2.6)

2.4.3 Wiring of the C-connector, D-connector, and small terminal box with lamp (L)



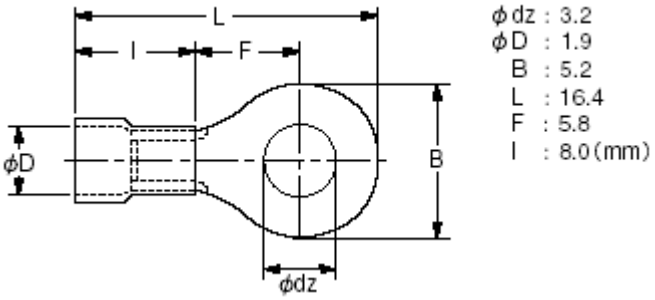
(Figure 2.7)

2.5 Wiring method (With limit switch)

(1) Wiring

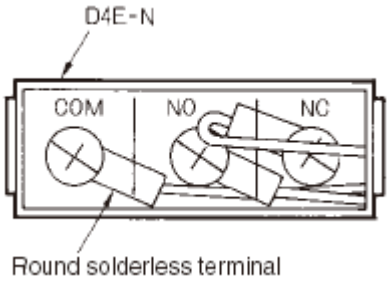
・ When wiring screw terminals, use M3-size round solderless terminals with an insulation tube is recommended.
The conductor size should be 0.75 mm² and cable diameter should be 7 mm.
（Figure 2.8, Figure 2.9）

Round solderless terminals



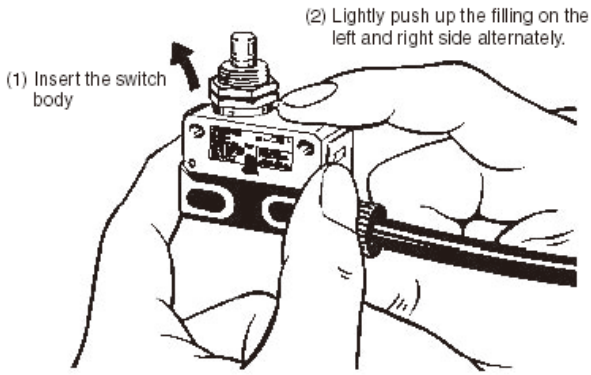
（Figure 2.8）

Wiring Method



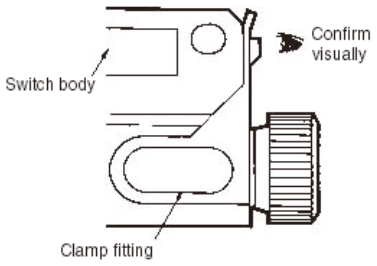
（Figure 2.9）

・ If the one-touch connector is to be mounted onto the switch body, lightly push up the fitting so that the switch body can then be inserted into the clamp. （Figure 2.10）



（Figure 2.10）

・ Be sure that the clamps are inserted to the full depth, because the Switch will not function properly if one of the clamps is improperly inserted. （Figure 2.11）



（Figure 2.11）

・ If the clamps are properly inserted up to the full depth, it will not slide out easily.
Be sure to confirm all the above items.

The limit switch is D4E-1G20N made by OMRON Corporation.
Please refer to the catalogue of D4E-1G20N for the details.

3. Pre-operation (post-installation) check

3.1 Appearance check

⚠WARNING	Shut off the fluid flow.(Close the main shut-off valve) Exhaust the fluid remaining in the valve.

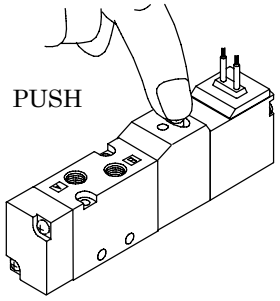
(1) Push the valve with the finger to check that the valve has been properly fixed to the pipe.
(2) Check that the fasteners including hexagon socket head cap screws and bolts are not loose.

3.2 Check for leakage

(1) Apply pressure to the fluid to check for leakage at pipe joints.
It is recommended to check for leakage by supplying compressed air of 0.3 to 0.5MPa and applying soap water to the joints. Air bubbles will appear at the leaking joints.

3.3 Solenoid valve manual override

(1) Manual operation (Non-lock type manual operation)
1) Supply compressed air (Double acting : 0.35 to 0.7MPa, Single acting : 0.4 to 0.7MPa) to the pilot port.
2) Push the manual shaft until it bottoms. The valve will be energized while the manual shaft is pushed. The valve will return when the manual shaft is released.
(See Figure 3.1)

Name	Non-lock type manual operation
Shape	 Keeps on activation during the time this button is pushed

(Figure 3.1)

3.4 Electrical check of the solenoid valve

⚠WARNING	Turn off the power supply. Do not touch the wiring connection sections (bare live part) when energized. There is a risk of electric shock.

(1) Check the dielectric resistance.
Measure the dielectric resistance using a 100V DC megohmmeter between a metallic part such as screw fixing the valve and the active part of the lead. The measured dielectric resistance shall be 100Mohms or more.

(2) P Check the supply voltage.
The voltage fluctuation shall be within ±10% of the rated voltage.
Usage in a out range of allowable voltage cause a mis-operation or coil burning.

(3) When changing a line voltage.
This product carries the solenoid valve "4KB119－00" of our company. When you change voltage, Exchange 4KB119－00. Please refer to an exclusive catalog about 4KB119－00.

3.5 Electrical check (With limit switch)

⚠WARNING	Turn off the power supply. Do not touch the wiring connection sections (bare live part) when energized. There is a risk of electric shock.

(1) Please refer to Table 3.1 for the rating.

Table 3.1. Ratings

Rated voltage	Non-inductive load (A)			
	Resistive load		Lamp load	
	NC	NO	NC	NO
250VAC	5		1.5	
30VDC	5		－	

(2) Power supply shall be more than 0.8W. Contact faults may occur if a Switch for general-load is used to switch a micro load circuit.

(3) Values above show normal current.

(4) Light load refers to a load with 10-fold rush current.

(5) The maximum rush current is 10 A.

(6) Consult with CKD when using at extremely small loads.

(7) The limit switch is D4E-1G20N made by OMRON Corporation. Please refer to the catalogue of D4E-1G20N for the details.

4. Instructions for proper use

4.1 Precautions at use

⚠WARNING	a) Do not use this product for an emergency shut off valve. ・The valves listed in this catalog are not designed as valves to ensure safety such as emergency shut off valves. When using in this type of system, always take separate measures that will absolutely ensure safety. b) Take measures to prevent harm to operators or objects if this product fails. c) Don't touch the electric wiring part while it is energized. There is fear of the electric shock. d) Liquid-filled state ・ When conveying a liquid in a circuit, operation may fail if liquid-filled state occurs. This is because pressure rises in the liquid filled state when temperature changes. e) Working fluids ・ Do not use this product for fluids other than the working fluids listed in the specifications. ・ Before starting use, confirm the compatibility of the product and applicable fluid with the catalog Applicable Fluid Check List. ・ Internal parts may wear when the valve operates. Caution is required because wear chips could enter the secondary side of the valve.

⚠CAUTION	a) Observe the working pressure range. b) Water hammer prevention When preventing water hammer, restrict the exhaust side with metering valve with silencer and flow control valve, etc. c) Failure to observe the cycle rate could shorten service life. d) Do not touch the stem on the top of the actuator when activated. e) Generally, the valve can be used with a fluid viscosity of up to 500mm²/s. However, the properties may differ according to the fluid type, so consult with CKD. f) Observe the pressurization direction (C-port pressurization limit) for the 3 port valve.

(1) Do not put any object on the valve.

(2) The working pressure range and temperature range of the fluid and ambient temperature range shall be satisfied.

(3) Do not use this product in a explosive gas atmosphere.(applies only for products with limit switch)

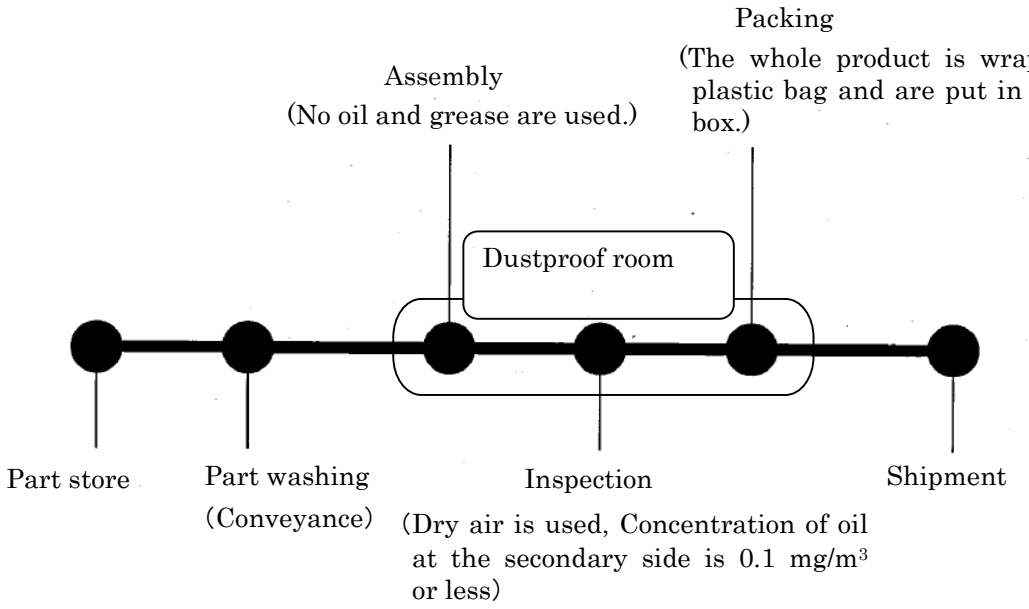
(4) Perform trial run if the product has not been used for a long time.

(5) Refer to "6. Troubleshooting" if any abnormality occurs.

(6) Life could be shortened when using dry air (atmospheric dew point -20°C or less) at AC voltage. Using DC voltage with dry air is recommended. Consult with CKD when using AC voltage.

4.2 About oil removal

In CKD, high quality oil removal is attained by the following assembling procedures.
Take care when handling the product.



4.3 Disassembly procedure

CAUTION	a) Close the main supply valve and stop fluid flow. b) Exhaust the fluid remaining in the valve.

(1) Before disassembly, release the pilot and fluid pressure.
Confirm that there is no residual pressure inside the product.

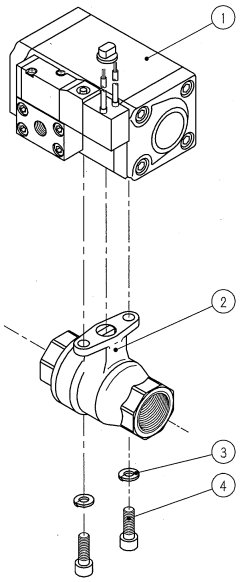
(2) Remove the hexagon socket head cap screw or the hexagon bolt ④.
Then , remove the spring washer ③.

(3) Raise the actuator ① upwards.

№	Part name	Quantity
1	Actuator Assembly	1
2	Ball valve	1
3	Spring washer	2
4	Hexagon socket head cap screw(＊1) Hexagon bolt(＊2)	2

＊1: CHB－V※－10 to 25、CHB－X※－10 to 20、
CHBF－V※－15 to 20、CHBF－X※－15、
CHG－V※－15 to 25、CHG－X※－15 to 20

＊2: CHB－V※－32 to 50、CHB－X※－25 to 50、
CHBF－V※－25 to 40、CHBF－X※－20 to 40
CHG－V※－32 to 50、CHG－X※－25 to 50



(Figure 4.1) The exploded view of the actuator and the ball valve

⚠WARNING	Do not disassemble the actuator. ・ Press-fitted parts are used for the actuator. It is not reusable once it is taken off. ・ Do not disassemble the single acting type actuator section. Incorporated reinforced spring will pop out when disassembled.

⚠CAUTION	a) Do not disassemble the product if the body material is bronze. ・ Adhesives are applied to the connection part of the body and the cap. Once removed, external leak occurs from the connection part. b) When the ball valve is “oil removal type”, the product cannot be disassembled. ・ Since a high non-oil level is maintained, the composition parts of a ball valve are not exchangeable. Exchange the whole ball valve.

1) Disassembly of the ball valve (When the body material is stainless steel)

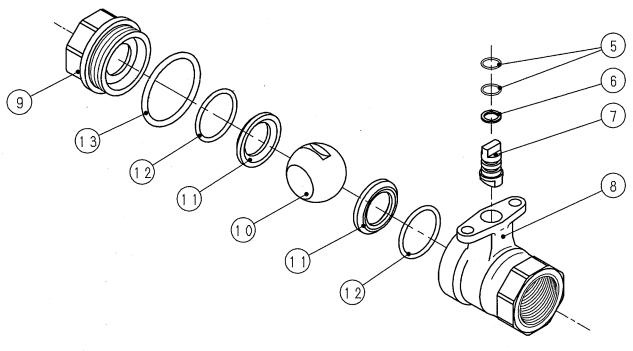
(1) Set the ball valve to the closed position.

(2) Firmly fix the opposite sides of the octagon shape of the valve body ⑧. Remove the valve cap ⑨ with a tool such as an adjustable spanner. Take out the valve ball ⑩ and the O ring ⑬. Replace the valve ball and the O ring if there are any sign of defects or corrosion.

(3) Take out the respective valve sheets ⑪ and O rings ⑫ from the valve body and the valve cap. Replace the valve seat and O ring if there are any sign of defects, corrosion or permanent distortion. It is recommended to replace the valve seat once it is disassembled, since re-used valve seats may leak internally.

(4) Take out the shaft ⑦ from the body .
Replace the O ring ⑤ if there are any sign of defects corrosion or permanent distortion. Replace the spacer ⑥ if abrasion loss is large.

№	Part name	Quantity
5	Oring	2
6	Spacer	1
7	Shaft	1
8	Valve body	1
9	Valve cap	1
10	Valve ball	1
11	Valve seat	2
12	Oring	2
13	Oring	1



（Figure 4.2） Ball valve exploded view

2) Disassembly of the solenoid valve kit

[Models excluding CHB－X※－40 to 50, CHBF－X※－32 to 40, CHG－X※－40 to 50]

(1) Remove the cross recessed head machine screw ⑭. Then, pull up the solenoid valve ⑮ and the gasket ⑯.

(2) Loosen the hexagon socket head cap screw ⑰. Then, remove the block ⑱ and the O ring ⑲.

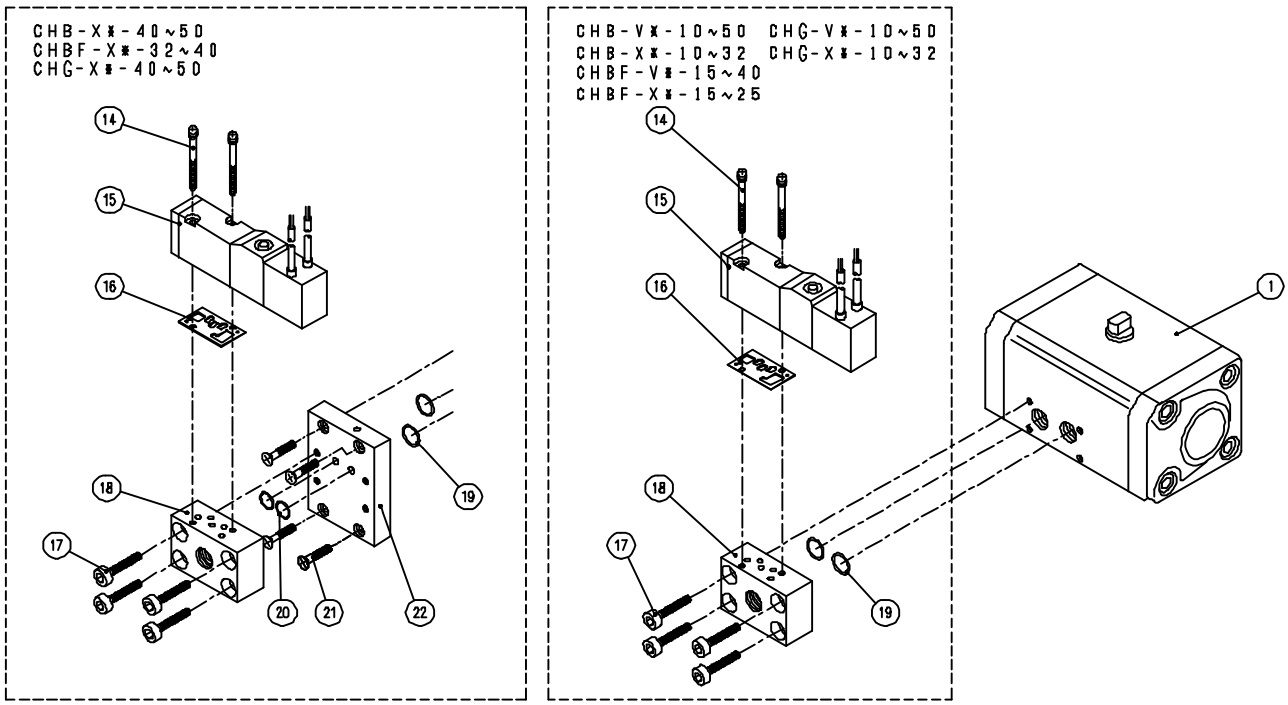
[Models CHB－X※－40 to 50, CHBF－X※－32 to 40, CHG－X※－40 to 50]

(1) Remove the cross recessed head machine screw ⑭. Then, pull up the solenoid valve ⑮ and the gasket ⑯.

(2) Loosen the hexagon socket head cap screw ⑰. Then, remove the block ⑱ and the O ring ⑳.

(3) Loosen the cross recessed countersunk head machine screw ㉑. Then, remove the plate ㉒ and the O ring ⑲.

No.	Parts name	Quantity
14	Cross recessed head machine screw	2
15	Solenoid valve（4KB119－00）	1
16	Gasket	1
17	Hexagon socket head cap screw	4
18	Block	1
19	O ring	2
20	O ring	2
21	Cross recessed countersunk head machine screw	4
22	Plate	1



（Figure 4.3）Solenoid valve kit exploded view

Please refer to instruction manual of 4KB119－00 about decomposition of a solenoid valve.

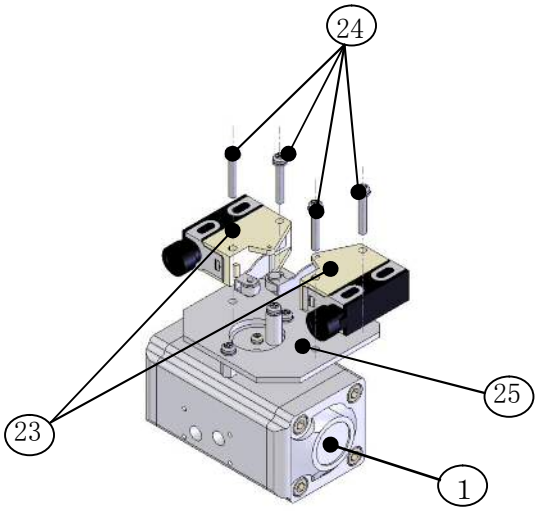
3) Disassembly of the limit switch (option)

(1) Take off the cross recessed head cap screw㉔ .

(2) Remove the limit switch㉓ .

No.	Parts name	Quantity
23	Limit switch（D4E-1G20N）	2（1）
24	Cross recessed head screw with captive washer	4（2）
25	LS plate	1

※Quantity described in ( ) is when there is one limit switch for detection at valve open (H) and detection at valve closed (V).



（Figure 4.4）Limit switch exploded view

4.4 Assembly procedure

1) The assembly of the solenoid valve kit

[Models excluding CHB－X※－40 to 50, CHBF－X※－32 to 40, CHG－X※－40 to 50]

(1) Apply lithium grease or silicone grease to the O ring ⑲.

・ Recommended lithium grease : Idemitsu Kosan Co., Ltd. Daphne Eponex Grease No.1

・ Recommended silicone grease : Shin-Etsu Chemical Co., Ltd. Shin-Etsu silicone G－30H

(2) Set the O ring ⑲ to the block ⑱.

(3) Attach the block ⑱ to the actuator ① using the hexagon socket head cap screw ⑰.
Tightening torque of the hexagon socket head cap screw : 0.6 to 0.8N・m.

(4) Attach the solenoid valve ⑮ and the gasket ⑯ to the block ⑱ using the cross recessed head machine screw ⑭.

[Models CHB－X※－40 to 50, CHBF－X※－32 to 40, CHG－X※－40 to 50]

(1) Apply lithium grease or silicone grease to the O ring ⑲⑳.

(2) Set the O ring ⑲ to the plate ㉒ .

(3) Attach the plate ㉒ to the actuator ① using the cross recessed countersunk head machine screw ㉑ .
Tightening torque of the cross recessed countersunk head machine screw : 1.5 to 1.9 N・m.

(4) Set the O ring ⑳ to the plate ㉒ .

(5) Attach the block ⑱ to the actuator ① using the hexagon socket head cap screw ⑰.
Tightening torque of the hexagon socket head cap screw : 0.6 to 0.8N・m.

(6) Attach the solenoid valve ⑮ and the gasket ⑯ to the block ⑱ using the cross recessed head machine screw ⑭.

2) Assembly of the ball valve (When the body material is stainless steel)

(1) Apply silicone grease to the O ring ⑤⑫⑬.

・ Recommended silicone grease : Shin-Etsu Chemical Co., Ltd. Shin-Etsu silicone G－30H

(2) Set the O ring ⑤ and the spacer ⑥ to the shaft ⑦.

・ Set the O ring certainly to the O ring groove on the shaft.

(3) Apply silicone grease to the part on which the shaft slides, and set the shaft to the valve body.

(4) Set the O ring ⑫ and the valve seat ⑪ to the valve body ⑧ and the valve cap ⑨ one piece each.

(5) Set the valve ball ⑩ to the valve body.
・ Align the direction of the valve ball with the shaft.

(6) Set the O ring ⑬ to the valve body and screw the valve cap into the valve body.
・ Refer to Table 4.1 for the tightening torque of the valve cap.

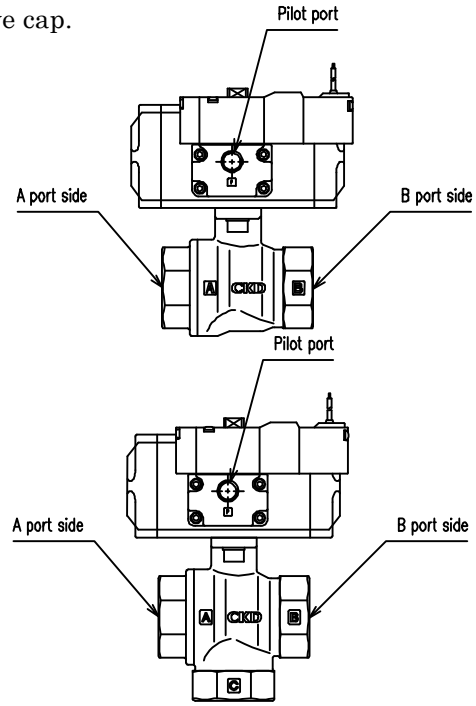
Table 4.1 Recommended tightening torque of the valve cap

Nominal dia.	Tightening torque(N・m)
10･15A	38 to 42
20A	76 to 84
25A	95 to 105
32A	171 to 189
40A	209 to 231
50A	266 to 294

Refer to "8. internal construction drawings" for details.

(7) Attach the actuator as shown in Fig.4.5
Align the direction of the stem of the actuator with the shaft of the ball valve at this time.

(8) Tighten the two hexagon socket head cap screws or the hexagon bolts and spring washers, with torque 4.5 to 5.5N･m.



（Figure 4.5） Actuator attachment direction

3) The assembly of the limit switch (option)

(1) Attach the limit switch㉓ to the LS plate㉕ with the cross recessed head screw with captive washer㉔ .

(2) Tightening torque of the cross recessed head screw with captive washer : 1.18 to 1.37 N･m.

5.Maintenance

5.1 Maintenance and inspection

(1) Always read the instruction manual thoroughly before starting maintenance to ensure correct operations.

(2) In order to use this product in the best condition, usually perform a scheduled inspection every half a year.

(3) Always carry out trial run before operation if the product was not used for more than a month.

(4) Refer to "3. Pre-operation check " for the contents of inspection.

5.2 Service parts

(1) Ball valve, Valve seat, O ring for ball valves.
Replace when abnormalities such as leak, adherence or delay occurs while in use.
As a reference, the number of operation cycles is 50,000.

(2) Actuator
Replace when abnormalities such as leak or operation malfunction occurs while in use.
As a reference, the number of operation cycles is 200,000 .

(3) Limit switch (option)
Replace when abnormalities, such as reset failure or oxidation of contacts, occurs while in use.
As a reference, the number of operation cycles is 500,000 .

6.Troubleshooting

(1) Perform manual operation at power failure and at emergencies such as malfunction.

⚠ CAUTION	Single acting type cannot be operated manually.

(2) The method of manual operation

- After cutting off pilot air and releasing the pressure in the actuator, slowly turn the stem at the upper part of actuator with an adjustable spanner.
- Since a spring is built-in the actuator of single acting type, manual operation cannot be performed.

(3) If a valve does not operate as intended, please check according to the following table.

The state of failure	Cause	Countermeasure
A valve does not operate.	The operation pressure of the actuator is low.	Set the operation pressure within product specification.
	The operation pressure of the actuator has not switched.	Inspect the solenoid valve used for operation.
	The pressure of fluid to be controlled is too high.	Set the pressure within product specification.
	The viscosity of fluid to be controlled is too high.	Control the fluid viscosity below 500mm²/s.
	Foreign matter such as solid is caught inside.	Inspect inside the ball valve and remove the cause.
	Foreign matter adheres to the valve seat and the valve ball.	
	Electric signal does not reach the solenoid valve.	Confirm that the electric signal reaches the solenoid valve.
	Input voltage differs from the rated voltage of the solenoid valve.	Apply rated voltage to the solenoid valve.
It is not a normal motion although operated.	The operation pressure of the actuator is low.	Set the operation pressure within product specification.
	The pressure of fluid to be controlled is too high.	Set the pressure within product specification.
	Foreign matter such as solid is caught inside.	Inspect inside the ball valve and remove the cause.
	Foreign matter adheres to the valve sheet and the valve ball.	

The state of failure	Cause	Countermeasure
The valve leaked. (The valve does not close completely.)	Foreign matter such as solid is caught inside.	1. When body material is bronze or it is “oil removal type”: Replace The ball valve.
	Wear of a valve sheet.	2. When body material is stainless Steel: Replace or repair the ball valve. The contents of repair. ・Replace the valve ball (when there is a crack). ・Replace the valve sheet. Replace the O ring.
	The pressurization direction is wrong. (It is pressurized from A port or B port for CHG.)	Pressurize from C port (COM) .

(4) Please contact us or your nearest agent for any unclear points.

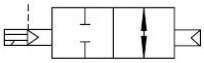
7. Product specification and model number display method

7.1 2 port valve (CHB-V, CHB-X, CHBF-V, CHBF-X)

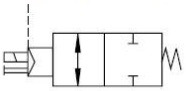
JIS symbol

● CHB-V1
CHBF-V1
(Double acting - NC)

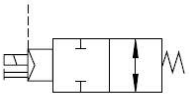
● CHB-V2
CHBF-V2
(Double acting - NO)



● CHB-X1
CHBF-X1
(Single acting - NC)



● CHB-X2
CHBF-X2
(Single acting - NO)



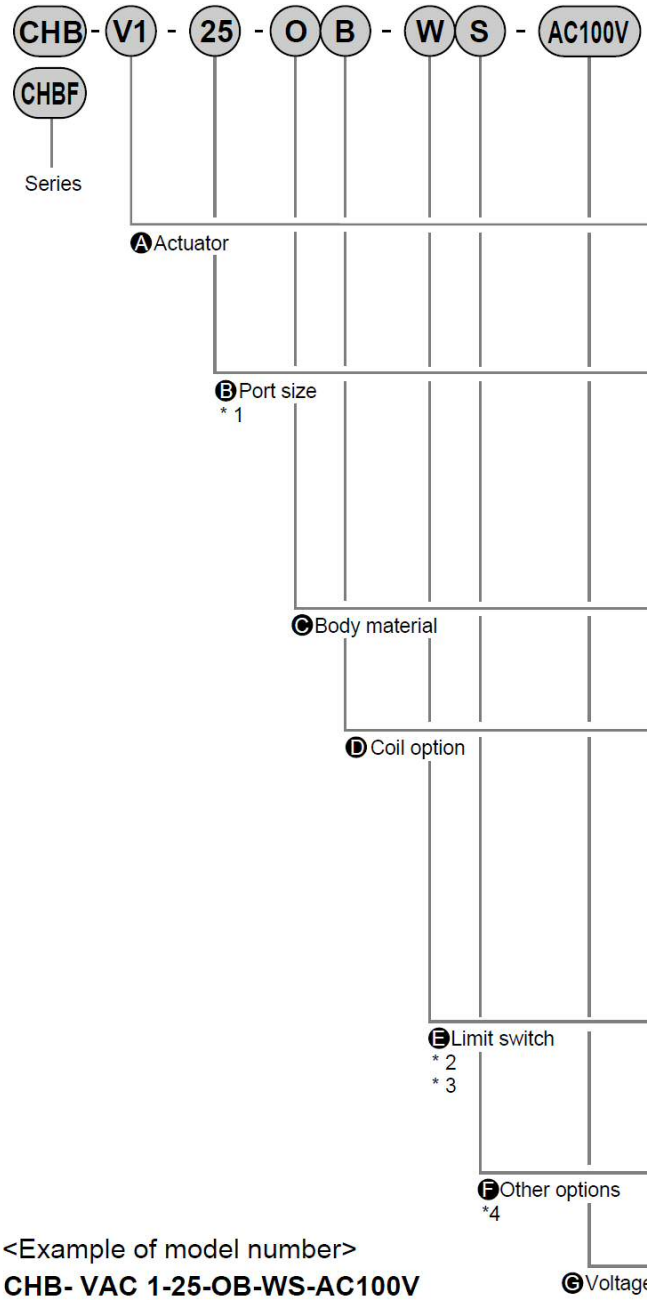
Common specifications

Descriptions			Double acting type CHB-V* (standard bore) CHBF-V* (full bore)	Single acting type CHB-X* (standard bore) CHBF-X* (full bore)
Actuation			Solenoid valve mounted type: Double acting	Solenoid valve mounted type: Single acting
Working fluid			Water, hot water, air, oil (500mm^2/s or less)	
Working pressure range MPa			0 to 1.0	
Withstanding pressure (water) MPa			2.0	
Fluid temperature ℃			0 to 80 (no freezing)	
Ambient temperature ℃			-10 to 60 (no freezing)	
Working environment			Indoors	
Valve seat leakage cm^3/min			0 (under 1MPa water pressure)	
Installation attitude			Free	
Cycle rate Cycle/min.			1 or less	
Rotary actuator	Pilot fluid		Compressed air	
	Lubrication		Not required (if lubrication is required, use turbine oil Class 1, ISO VG32.)	
	Withstanding pressure (water) MPa		1.05	
	Working pressure range MPa		0.35 to 0.7	0.4 to 0.7
	Fluid temperature ℃		5 to 60	
	Port size	P port	Rc1/8	Rc1/8
		EHX port	Rc1/8	Rc1/8
Electrical specifications				
Rated voltage			100 VAC (50/60Hz), 200 VAC (50/60Hz), 24 VDC	
Inrush current (A)	100 VAC		0.056/0.044 (50/60Hz)	
	200 VAC		0.028/0.022 (50/60Hz)	
	24 VDC		0.075	
Holding current (A)	100 VAC		0.028/0.022 (50/60Hz)	
	200 VAC		0.014/0.011 (50/60Hz)	
	24 VDC		0.075	
Power consumption (W)	100 VAC		1.8/1.4 (50/60Hz)	
	200 VAC		1.8/1.4 (50/60Hz)	
	24 VDC		1.8	
Insulation class			Class B molded coil	
Protection structure			Dust proof	
Voltage fluctuation range			±10%	

Individual specifications

Descriptions / Series		Port size	Orifice (mm)	Cv flow factor	Mass (kg) Double acting	Mass (kg) Single acting
Standard bore	**CHB-V*/X*-10-***	Rc3/8	10	10	1.2	1.3
	CHB-V*/X*-15-*	Rc1/2	10	6	1.2	1.3
	CHB-V*/X*-20-*	Rc3/4	15	16	1.4	1.5
	CHB-V*/X*-25-*	Rc 1	20	29	1.5	2.4
	CHB-V*/X*-32-*	Rc1 1/4	25	50	2.4 (2.5)	2.9 (3.0)
	CHB-V*/X*-40-*	Rc1 1/2	32	98	2.8 (2.9)	5.0 (5.1)
	CHB-V*/X*-50-*	Rc 2	40	125	3.6 (3.7)	5.8 (5.9)
Full bore	**CHBF-V*/X*-15-***	Rc1/2	15	23	1.4	1.5
	CHBF-V*/X*-20-*	Rc3/4	20	51	1.5	2.4
	CHBF-V*/X*-25-*	Rc 1	25	66	2.4	2.9
	CHBF-V*/X*-32-*	Rc1 1/4	32	114	2.8	5.0
	CHBF-V*/X*-40-*	Rc1 1/2	40	176	3.6	5.8

Note 1: Models above show basic body materials. See "How to order" about other combinations. ( ) shows values for stainless steel body
Note 2: CHB-V*/X*-10-* is a full bore.
Note 3: When a limit switch is used, weight increases +0.2 kg for 1 switch and +0.3 kg for 2.
Note 4: CHB-X*-40/50-*, CHBF-X*-32/40-* are not compatible with the limit switch.



Symbol	Descriptions	Series CHB (Standard bore)	Series CHBF (Full bore)
Ⓐ Actuator			
V1	Double acting NC (normally closed) type	●	●
V2	Double acting NO (normally open) type	●	●
X1	Single acting NC (normally closed) type	●	●
X2	Single acting NO (normally open) type	●	●
Ⓑ Port size			
10	Rc 3 / 8	●	
15	Rc 1 / 2	●	●
20	Rc 3 / 4	●	●
25	Rc 1	●	●
32	Rc 1¼	●	●
40	Rc 1½	●	●
50	Rc 2	●	
Ⓒ Body material			
0	Bronze	●	●
E	Stainless steel	●	●
N	Stainless steel Oil removal	●	●
Ⓓ Coil option			
Blank	Grommet lead wire	●	●
B	Small terminal box	●	●
L	Small terminal box + light	●	●
C	C-connector + lead wire	●	●
C2	C-connector + lead wire Surge suppressor + light	●	●
D	D-connector + lead wire	●	●
D2	D-connector + lead wire Surge suppressor + light	●	●
Ⓔ Limit switch			
Blank	Without switch	●	●
H	Detection at valve open	●	●
V	Detection at valve closed	●	●
W	With 2 switches	●	●
Ⓕ Other options			
Blank	Blank	●	●
S	Metering valve with silencer *4	●	●
Ⓖ Voltage			
AC100V	100 VAC 50/60Hz, 110 VAC 60Hz	●	●
AC200V	200 VAC 50/60Hz, 220 VAC 60Hz	●	●
DC24V	24 VDC	●	●

*1: Port size 10 is a full bore, but the model is CHB.
2: CHB-X-40/50-*, CHBF-X*-32/40 are not compatible with the limit switch.
*3: OMRON D4E-1G20N
*4: CKDSMW2-6A is enclosed with product.

<Example of model number>

CHB- VAC 1-25-OB-WS-AC100V

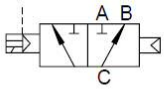
Series: CHB (standard bore)

Ⓐ Actuator	: Double acting NC (normally closed) type
Ⓑ Port size	: Rc1
Ⓒ Body material	: Bronze
Ⓓ Coil option	: Small terminal box
Ⓔ Limit switch	: With 2 switches
Ⓕ Other options	: Metering valve with silencer
Ⓖ Voltage	: 100 VAC 50/60Hz, 110 VAC 60Hz

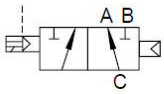
7.2 3 port valve (CHG-V, CHG-X)

JIS symbol

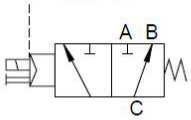
● CHG-V1 (Double acting - Constant B - C Flow path)



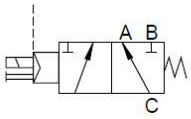
● CHG-V2 (Double acting - Constant A - C Flow path)



● CHG-X1 (Single acting - Constant B - C Flow path)



● CHG-X2 (Single acting - Constant A - C Flow path)



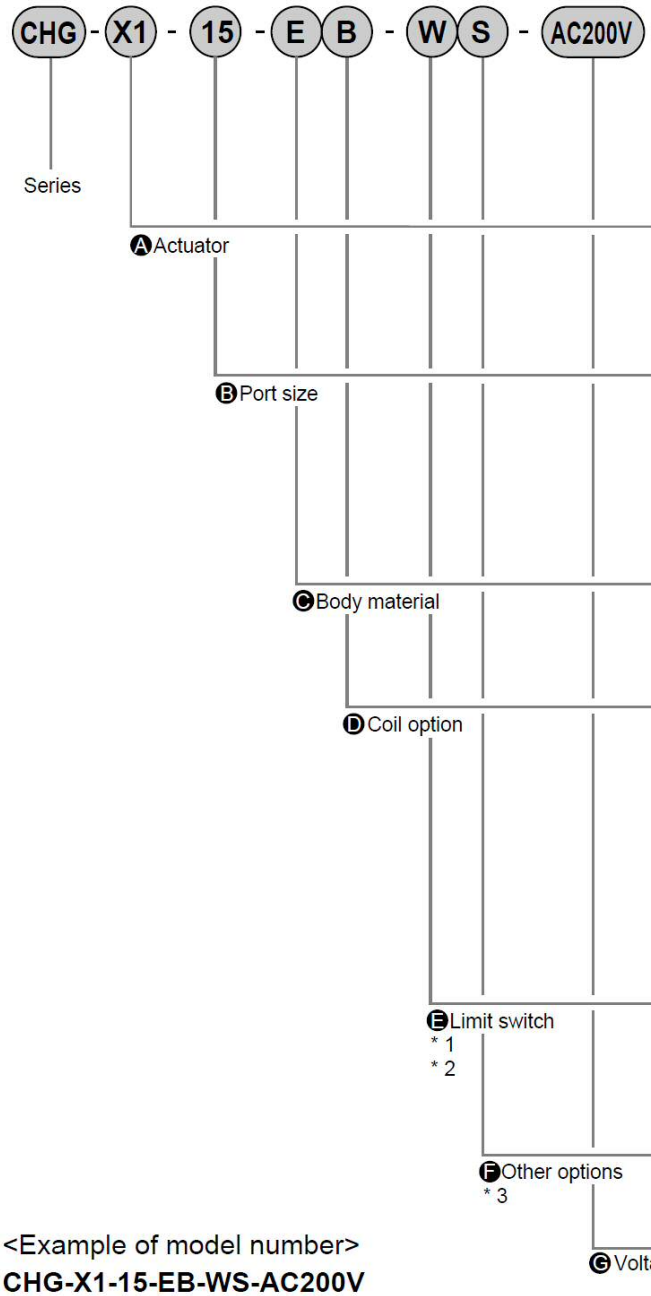
Common specifications

Descriptions			CHG-V* (Double acting)	CHG-X* (Single acting)
Actuation			Solenoid valve mounted type: Double acting	Solenoid valve mounted type: Single acting
Working fluid			Water, hot water, air, oil (500mm^2/s or less)	
Working pressure range MPa			0 to 1.0	
Withstanding pressure (water) MPa			2.0	
Fluid temperature ℃			0 to 80 (no freezing)	
Ambient temperature ℃			-10 to 60 (no freezing)	
Working environment			Indoors	
Valve seat leakage cm^3/min			0 (under 1MPa water pressure)	
Installation attitude			Free	
Cycle rate Cycle/min.			1 or less	
Pressurization direction			Limited to Port C pressurized	
Flow path shape			Multi-fluid type (90° rotation switching type)	
Rotary actuator	Pilot fluid		Compressed air	
	Lubrication		Not required (if lubrication is required, use turbine oil Class 1, ISO VG32.)	
	Withstanding pressure (water) MPa		1.05	
	Working pressure range MPa		0.35 to 0.7	0.4 to 0.7
	Fluid temperature ℃		5 to 60	
	Port size	P port	Rc1/8	Rc1/8
		EHX port	Rc1/8	Rc1/8
Electrical specifications				
Rated voltage			100 VAC (50/60Hz), 200 VAC (50/60Hz), 24 VDC	
Inrush current (A)	100 VAC		0.056/0.044 (50/60Hz)	
	200 VAC		0.028/0.022 (50/60Hz)	
	24 VDC		0.075	
Holding current (A)	100 VAC		0.028/0.022 (50/60Hz)	
	200 VAC		0.014/0.011 (50/60Hz)	
	24 VDC		0.075	
Power consumption (W)	100 VAC		1.8/1.4 (50/60Hz)	
	200 VAC		1.8/1.4 (50/60Hz)	
	24 VDC		1.8	
Insulation class			B	
Protection structure			Dust proof	
Voltage fluctuation range			±10%	

Individual specifications

Descriptions / Series	Port size	Orifice (mm)	Cv flow factor	Mass (kg)	
				Double acting	Single acting
CHG-V*/X*-15-*	Rc1/2	10	3	1.3	1.4
CHG-V*/X*-20-*	Rc3/4	14	6	1.4	1.5
CHG-V*/X*-25-*	Rc 1	19	11	1.6	2.5
CHG-V*/X*-32-*	Rc1 1/4	23	16	2.5	3.6
CHG-V*/X*-40-*	Rc1 1/2	30	28	3.0	5.2
CHG-V*/X*-50-*	Rc 2	38	47	3.9	6.1

Note 1: Models above show basic body materials.
See "How to order" about other combinations.
Note 2: When a limit switch is used, weight increases +0.2 kg for 1 switch and +0.3 kg for 2.
Note 3: CHG-X*-40/50-* are not compatible with the limit switch.



Symbol	Descriptions
Ⓐ Actuator	
V1	Double acting Constant B - C Flow path
V2	Double acting Constant A - C Flow path
X1	Single acting Constant B - C Flow path
X2	Single acting Constant A - C Flow path
Ⓑ Port size	
15	Rc 1 / 2
20	Rc 3 / 4
25	Rc 1
32	Rc 1 1/4
40	Rc 1 1/2
50	Rc 2
Ⓒ Body material	
0	Bronze
E	Stainless steel
N	Stainless steel Oil removal
Ⓓ Coil option	
Blank	Grommet lead wire
B	Small terminal box,
L	Small terminal box + light
C	C-connector + lead wire
C2	C-connector + lead wire Surge suppressor + light
D	D-connector + lead wire
D2	D-connector + lead wire Surge suppressor + light
Ⓔ Limit switch	
Blank	Without switch
H	A-C flow path detection
V	B-C flow path detection
W	With 2 switches
Ⓕ Other options	
Blank	Blank
S	Metering valve with silencer *3
Ⓖ Voltage	
AC100V	100 VAC 50/60Hz, 110 VAC 60Hz
AC200V	200 VAC 50/60Hz, 220 VAC 60Hz
DC24V	24 VDC

1: CHG-X-40/50-* are not compatible with the limit switch.
*2: OMRON D4E-1G20N
*3: CKD SMW2-6A is used.

<Example of model number>

CHG-X1-15-EB-WS-AC200V

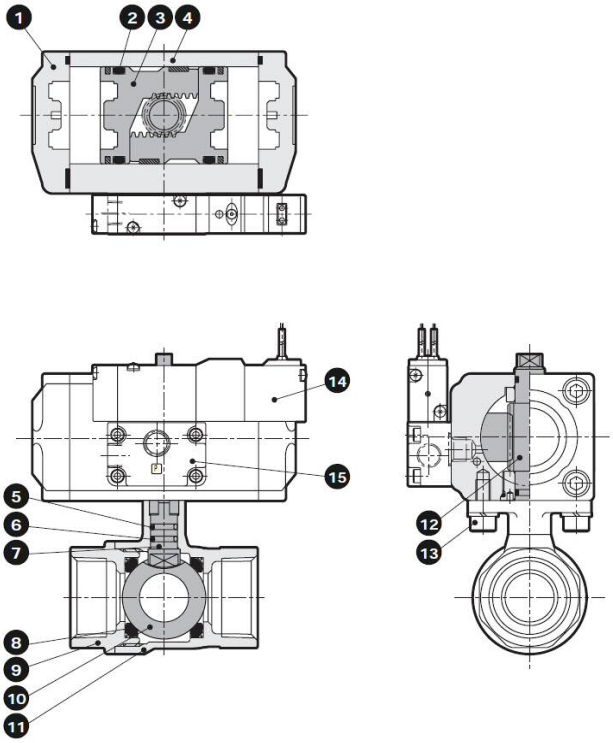
Series: CHG

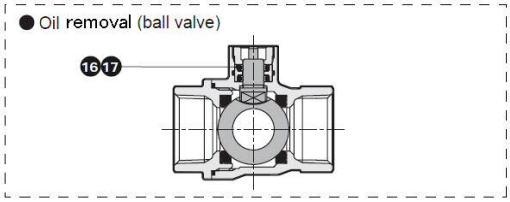
Ⓐ Actuator	: Single acting Constant B - Flow path C
Ⓑ Port size	: Rc1/2
Ⓒ Body materials	: Stainless steel (SCS13)
Ⓓ Coil option	: Small terminal box
Ⓔ Limit switch	: With 2 switches
Ⓕ Other options	: Metering valve with silencer
Ⓖ Voltage	: 200 VAC 50/60Hz, 220 VAC 60Hz

8. Internal construction drawings

8.1 2 port valve internal construction drawings

8.1.1 CHB-V、CHBF-V（Double acting type）

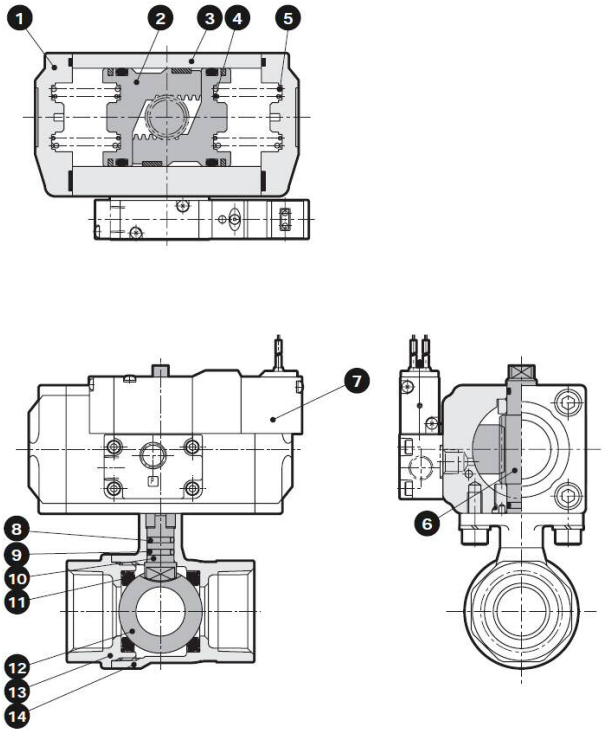


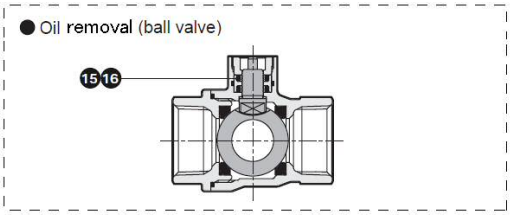


No.	Parts name	Material	
1	Cylinder cap	ADC12	Aluminum alloy die-casting
2	O ring	NBR	Nitrile rubber
3	Piston	ADC12	Aluminum alloy die-casting
4	Cylinder body	A6063	Aluminum
5	O ring	NBR (FKM)	Nitrile rubber (fluoro rubber)
6	O ring	FKM	Fluoro rubber
7	Shaft	SUS303 (SUS304)	Stainless steel (stainless steel)
8	Valve seat	PTFE	Tetrafluoroethylene resin
9	Valve cap	CAC408 (SCS13) CAC407	Bronze casting (stainless steel casting)
10	Valve ball	C3771, Cr plated (SUS304)	Brass, chrome plated (Stainless steel)
11	Valve body	CAC408 (SCS13) CAC407	Bronze casting (stainless steel casting)
12	Stem	SUS303	Stainless steel
13	Hexagon socket head cap screw	SUSXM7	Stainless steel
14	Solenoid valve (4KB119-00)		
15	Block	ADC12	Aluminum
16	O ring	FKM	Fluoro rubber
17	Sealing ring	UHMW-PE	Ultra high molecular weight polyethylene

( ) shows values for stainless steel body

8.1.2 CHB-X、CHBF-X（Single acting type）



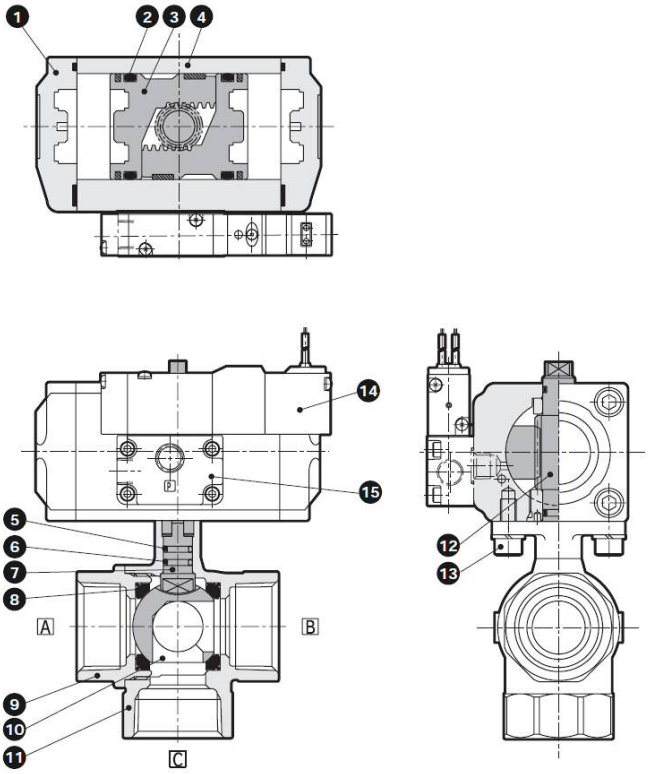


No.	Parts name	Material	
1	Cylinder cap	ADC12	Aluminum alloy die-casting
2	Piston	ADC12	Aluminum alloy die-casting
3	Cylinder body	A6063	Aluminum
4	Spring	SWP	Piano wire
5	Spring	SWP	Piano wire
6	Stem	SUS303	Stainless steel
7	Solenoid valve (4KB119-00)		
8	O ring	NBR (FKM)	Nitrile rubber (fluoro rubber)
9	O ring	FKM	Fluoro rubber
10	Shaft	SUS303 (SUS304)	Stainless steel (stainless steel)
11	Valve seat	PTFE	Tetrafluoroethylene resin
12	Valve ball	C3771, Cr plated (SUS304)	Brass, chrome plated (Stainless steel)
13	Valve cap	CAC408･CAC407 (SCS13)	Bronze casting (stainless steel casting)
14	Valve body	CAC408･CAC407 (SCS13)	Bronze casting (stainless steel casting)
15	O ring	FKM	Fluoro rubber
16	Sealing ring	UHMW-PE	Ultra high molecular weight polyethylene

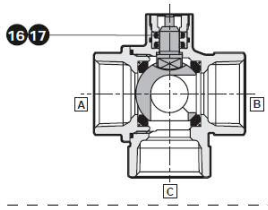
( ) shows values for stainless steel body

8.2 3 port valve internal construction drawings

8.2.1 CHG-V（Double acting type）



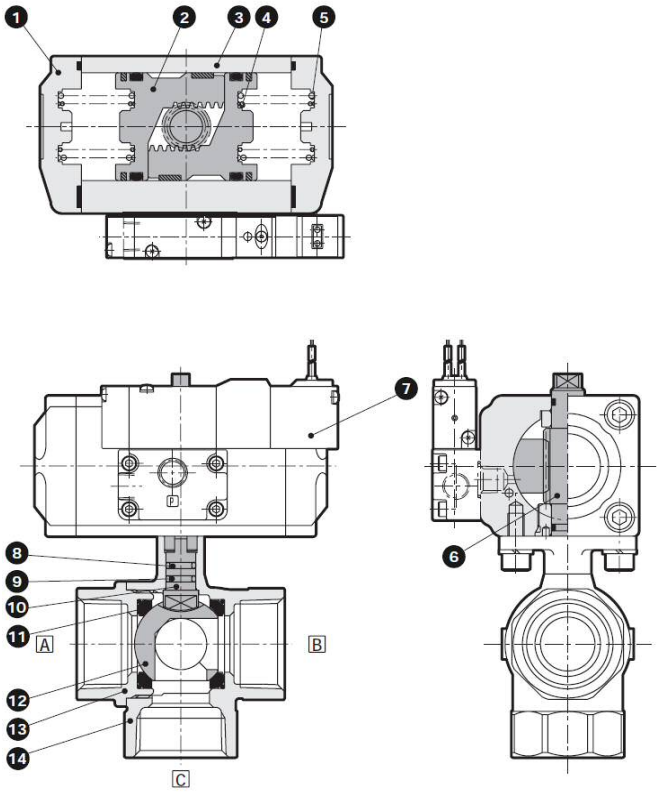
● Oil removal (ball valve)



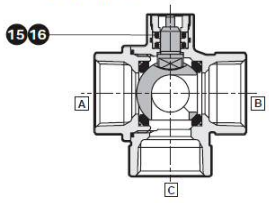
No.	Parts name	Material	
1	Cylinder cap	ADC12	Aluminum alloy die-casting
2	O ring	NBR	Nitrile rubber
3	Piston	ADC12	Aluminum alloy die-casting
4	Cylinder body	A6063	Aluminum
5	O ring	NBR (FKM)	Nitrile rubber (fluoro rubber)
6	O ring	FKM	Fluoro rubber
7	Shaft	SUS303 (SUS304)	Stainless steel (stainless steel)
8	Valve seat	PTFE	Tetrafluoroethylene resin
9	Valve cap	CAC408 (SCS13)	Bronze casting (stainless steel casting)
10	Valve ball	C3771, Cr plated (SUS304)	Brass, chrome plated (Stainless steel)
11	Valve body	CAC408 (SCS13)	Bronze casting (stainless steel casting)
12	Stem	SUS303	Stainless steel
13	Hexagon socket head cap screw	SUSXM7	Stainless steel
14	Solenoid valve (4KB119-00)		
15	Block	ADC12	Aluminum
16	O ring	FKM	Fluoro rubber
17	Sealing ring	UHMW-PE	Ultra high molecular weight polyethylene

( ) shows values for stainless steel body

8.2.2 CHG-X（Single acting type）



● Oil removal (ball valve)



No.	Parts name	Material	
1	Cylinder cap	ADC12	Aluminum alloy die-casting
2	Piston	ADC12	Aluminum alloy die-casting
3	Cylinder body	A6063	Aluminum
4	Spring	SWP	Piano wire
5	Spring	SWP	Piano wire
6	Stem	SUS303	Stainless steel
7	Solenoid valve (4KB119-00)		
8	O ring	NBR (FKM)	Nitrile rubber (fluoro rubber)
9	O ring	FKM	Fluoro rubber
10	Shaft	SUS303 (SUS304)	Stainless steel (stainless steel)
11	Valve seat	PTFE	Tetrafluoroethylene resin
12	Valve ball	C3771, Cr plated (SUS304)	Brass, chrome plated (Stainless steel)
13	Valve cap	CAC408 (SCS13)	Bronze casting (stainless steel casting)
14	Valve body	CAC408 (SCS13)	Bronze casting (stainless steel casting)
15	O ring	FKM	Fluoro rubber
16	Sealing ring	UHMW-PE	Ultra high molecular weight polyethylene

( ) shows values for stainless steel body