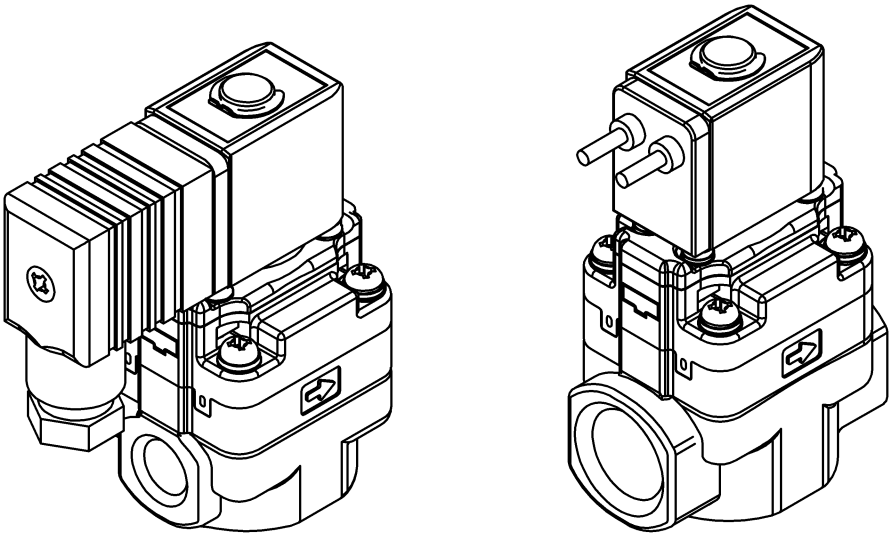
CKD

INSTRUCTION MANUAL

2-port pilot-operated solenoid valve for water

FWD Series



- 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.2

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.

This product cannot be used beyond its specifications. Additionally, the product must not be modified or machined.
This product is intended for use in general industrial devices and parts. Use beyond such conditions is not considered. Consult with CKD for details when using the product beyond the unique specification range, outdoors, or in the following conditions or environments. In any case, measures for safety shall be provided when the vavle malfunctions.

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, 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. Release 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 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 piping port protection until just before piping. Otherwise, foreign matter enters the valve and cause malfunction or bad operation.

1) Check that the model No. shown on the Name 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, keep the product inside the packing box to prevent the intrusion of foreign matter to the valve. Take out the valve when piping.

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) The product cannot be used in an explosive gas atmosphere. In such atmosphere, use our explosion-proof valve or air operated valve. b) For AC voltage products, a beat sound may occur from the product, depending on usage conditions. If such sounds were to be avoided, select DC voltage products. c) Do not use the product under corrosive gas atmosphere, or atmosphere that degrades product material. d) Use the product away from heating elements and radiant heat. e) Use the product within the specified ambient temperature range. f) The product may break if the fluid freezes. Provide appropriate measures against freezing. If heat insulating material is to be covered around the solenoid valve, do not cover around the coil. Otherwise, the coil will burn. g) Install the product away from rain, water, direct sunlight or ultraviolet rays. The product cannot be used outdoors. h) Protective measures shall be taken against splashing of oil or welding spatter on the product.

⚠ CAUTION	a) Install this product in a place free of vibration.

2. 2 Installation method

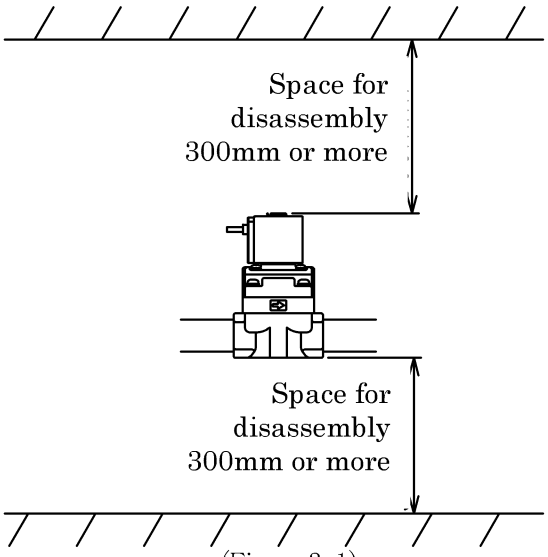
2.2.1 Mounting

⚠ CAUTION	a) Read this instruction manual thoroughly and understand the contents before installing the product. b) Always take hold of the Main Body (metal part) portion when handling and mounting the product. Do not apply force on the Coil Assembly portion. c) Make sure that there is no tension applied to the coil lead wire portion when installing. d) Always take hold of the Main Body (metal part) portion when carrying the product. Do not hang the product by its lead wire. e) After installation, confirm proper mounting by checking for leaks at the piping.

1) Mounting posture is unrestricted.

2.2.2 Maintenance space

・ Provide enough space for safe maintenance and troubleshooting work.



(Figure 2-1)

2. 3 Piping

⚠ CAUTION	a) When piping or re-piping, fix the product. Always fix the product by holding the Main Body (metal part). The product may break if the resin part is held when piping or re-piping. b) Fix and provide appropriate support to the piping, so that the weight and vibration of the piping will not directly be applied to the product. c) Tighten the piping with recommended torque shown in table 2-2. d) Observe effective thread length for the piping. Additionally, chamfer about half pitch of the thread from the tip. e) Before piping, flush the piping with compressed air 0.3MPa or more to remove foreign material such as dust, metal powder, rust and sealing material.

	f) Do not use excessive amount of sealing material (seal tape, gelatinous sealant). Otherwise, the sealing material will enter the product and cause malfunction. g) When applying or taping the sealing material to the piping, leave 1.5 to 2 threads at the tip without the sealing material. h) Foreign matter such as dust in the fluid hinders normal product operation. Install a strainer (or filter) 80 mesh or finer at the primary side of the product. i) Make sure the piping to the product is performed correctly. Check the supply port and piping. j) To facilitate maintenance and inspection, i) use union or flanged joints, and ii) install a bypass pipe. k) When controlling a fluid in a tank, pipe at the level slightly above the bottom of the tank. l) If a regulator and solenoid valve is coupled directly, they may mutually vibrate, cause resonance, and result in chattering. m) If a portion of the pressure supply side piping is restricted, operation may become unstable due to lack of needed pressure differential. Select an appropriate size product with respect to supply side flow rate.

1) Cleaning the piping

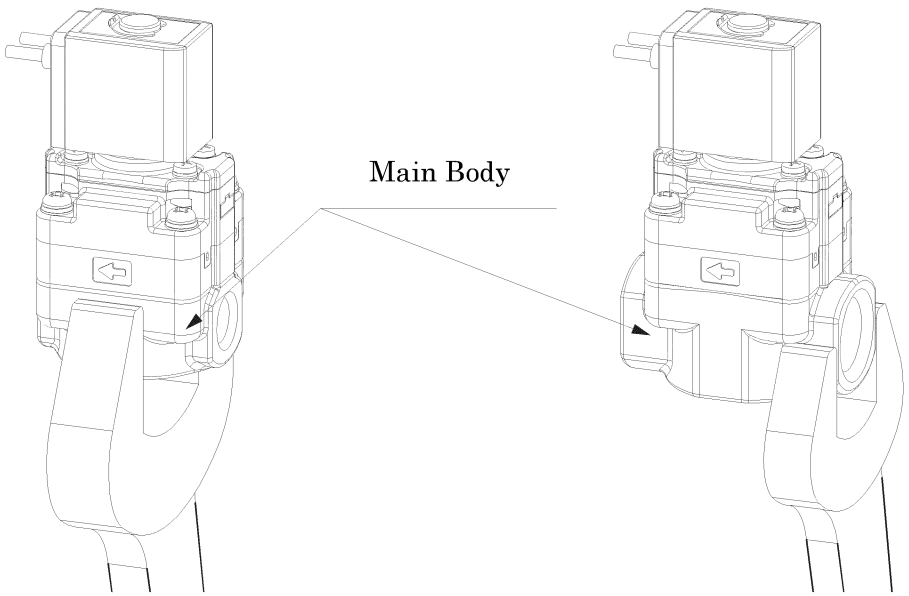
・ Before piping, flush the piping with compressed air 0.3MPa or more to remove foreign material such as dust, metal powder, rust and sealing material.

2) Removal of foreign matter

・ Foreign matter such as dust in the fluid causes malfunction and leakage.
To remove foreign matter, attach a strainer (filter) 80 mesh or finer.

3) Piping

・ Always take hold of the Main Body (metal part) portion when mounting the product. Do not take hold the resin part.

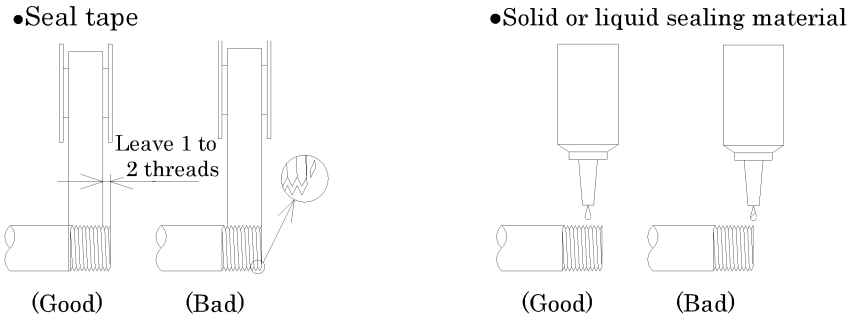


(Figure 2-2)

・ Fix the product by piping, or by the threaded hole on the bottom of the body.
・ When controlling a fluid in a tank, pipe at the level slightly above the bottom of the tank.

4) Sealing material

・ When using sealing material, make sure the sealing material do not enter the piping. Also, make sure there is no external leakage. When taping seal tape to the pipe thread, leave 1.5 to 2 threads at the tip without taping.
Also, when using liquid sealing material, leave 1.5 to 2 threads at the tip without sealing material. Do not apply too much sealing material on the thread. Do not apply sealing material to the internal thread (refer to Figure 2-3.) .



(Figure 2-3.) How to apply sealing material

5) Tightening

・ Refer to Table 2-2. for the recommended port tightening torque.

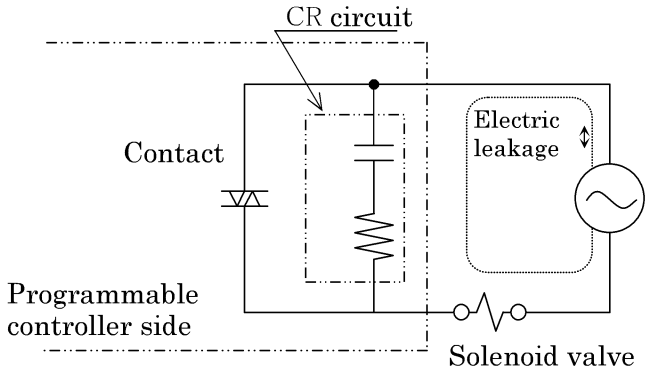
Table 2-2. Recommended port tightening torque

Port size	Tightening torque
Rc1/4	23-25[N・m]
Rc3/8	31-33[N・m]
Rc1/2	41-43[N・m]
Rc3/4	62-65[N・m]
Rc1	83-86[N・m]

2. 4 Wiring

⚠ CAUTION

a) Use within the allowed voltage range. Otherwise, malfunction and coil damage may occur.
b) Use a breaker such as a fuse on the control circuit side to protect the electric equipment.
c) If the electric circuit system is vulnerable to solenoid surge, use a product with surge suppressor (option) , or insert a surge suppressor parallel to the solenoid.
d) As a reference, the wiring electric wires must have a nominal sectional area of 0.5mm^2 or more.
e) Use of a switching circuit that does not cause contact chattering will lengthen the life of the solenoid valve.
f) When operating the solenoid valve using a device such as a programmable controller, confirm that the electric leakage output from the device is within values shown in the table below. If electric leakage exceeds the value in the table, the valve may malfunction.



Rated voltage	Electric leakage	
AC100V	8A, 10A, 15A	3mA or less
	20A, 25A	6mA or less
AC200V	8A, 10A, 15A	1.5mA or less
	20A, 25A	3mA or less
DC24V	1mA or less	

1) Wiring of the lead wire type

This product uses lead wires described below.

If a terminal is to be crimped onto the lead wire, crimp and insulate the terminal properly.

Conductor size	Insulating covering outer diameter
AWG20	φ2.6mm

There is no polarity even for DC voltage types.

2) Wiring of the DIN terminal box type

・Use the following cabtire cable.

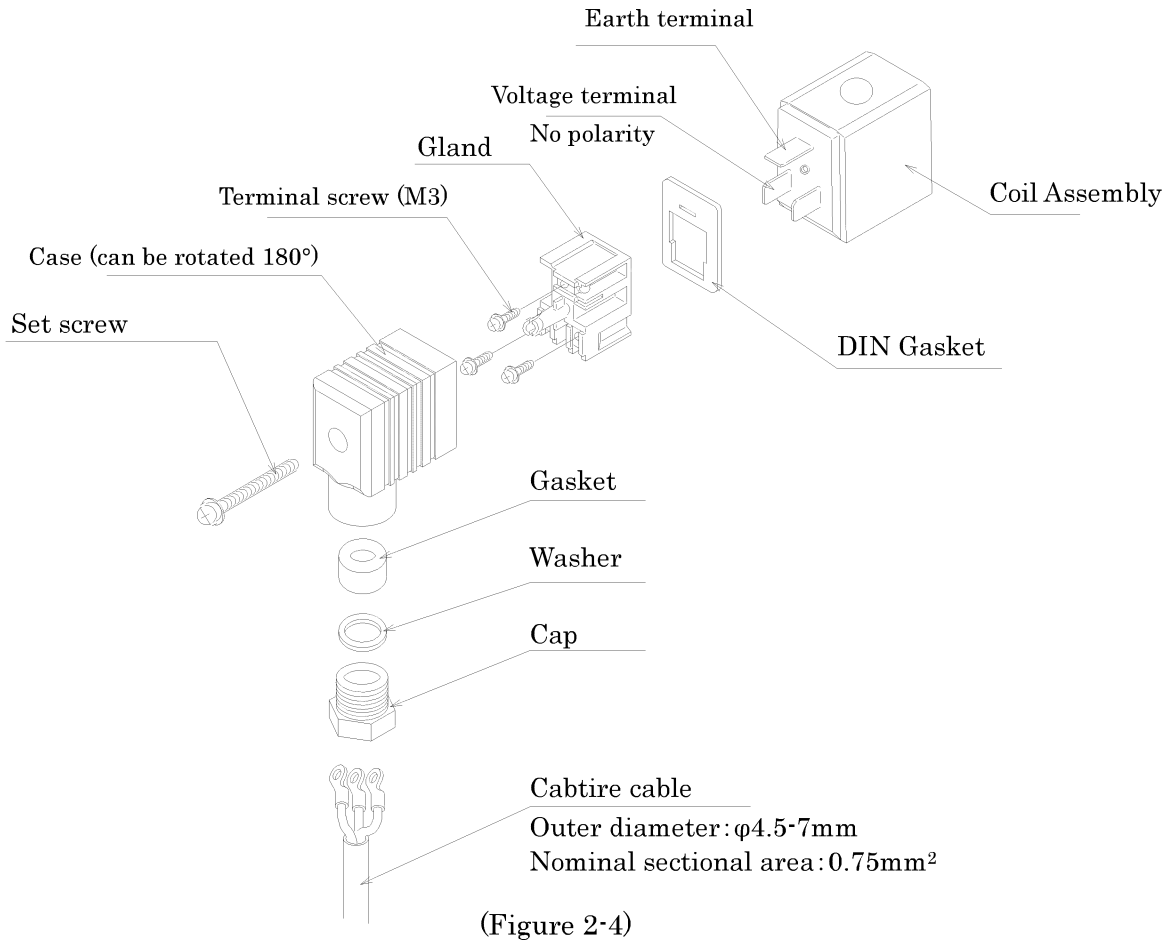
DIN Terminal Box	Cable outer diameter	Nominal sectional area
Pg9	φ4.5-7mm	0.75mm^2
Pg11	φ6-10mm	0.75-1.5mm^2

・Crimp the crimp terminal for copper wires to the lead wire of the cabtire cable.

The size of the terminal screw in the DIN terminal box is M3.

・Tighten the screw with torque shown below.

DIN terminal box mounting set screw	Terminal screw
0.5Nm	0.5Nm



(Figure 2-4)

①Pass the cabtire cable through the Cap, Washer and Gasket in that order. Insert the cable into the Case.

②Connect the cable to terminal 1 and 2 on the Gland. There is no polarity. Connect the ground cable to the Earth terminal.

③Set the Gland into the Case (push through until you hear a snapping sound).
The Gland can be rotated 180° for Pg9. The Gland can be rotated 90° for Pg11. Set the Gland into the Case according to the direction the cable needs to be taken out.

④Place the Gasket and Washer in the Case, and tighten the Cap.
Make sure that the cable does not fall off.

⑤After confirming that the DIN Gasket is in place, plug the DIN terminal box into the Coil, and fix it with the DIN terminal box set screw.

3. Pre-operation (post-installation) check

3. 1 Appearance check

⚠ WARNING	Stop the flow of the fluid（shut the supply）. Discharge the fluid inside the product. Shut off power supply.

1) Push the product by hand and confirm that the product is firmly fixed on the piping.
2) Confirm the piping is done properly.
3) Confirm that no screws and bolts are loose.
4) Confirm that the wiring is done properly.

3. 2 Leakage check

1) Confirm leakage at the connection part by applying pressure to the fluid.
We recommend leakage check by the following method:
- Supply compressed air (0.3-0.5MPa)
- Apply soap water to the portion to check for leakage
- Bubbles will appear if there is any leakage.

3. 3 Electrical check

⚠ WARNING	Cut off the electricity. Check while taking serious care to avoid electric shock.

1) Check the supply voltage.
Voltage variation shall be within 10% of the rated voltage.
Use beyond the allowed variation range will cause malfunction or damage to the coil.

2) Check insulation resistance
Check the insulation resistance between dead metal parts and un-insulated live parts (such as the tip of the lead wire) that are assembled to the product.
Confirm that insulation resistance is over 100MΩ at DC1000V megger.

4. Instructions for proper use

4. 1 Handling precautions

⚠ WARNING	a) Do not use this product as an emergency shut-off valve. ・ This product is not designed as a safety-securing valve, such as an emergency shut-off valve. For such systems, use this valve after providing another method of securing safety. b) Take measures to prevent harm to operators or objects if this product fails. c) 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 rises. Provide an escape valve in the system so that a liquid-filled state circuit is not created. d) Working fluids ・ Do not convey fluids other than water. ・ Internal parts may wear when the valve operates. Caution is required because wear chips could enter the secondary side of the valve. e) Foreign matter such as rust and dust in the fluid causes malfunction and leakage, which degrades product performance. Provide measures to remove foreign matter. f) Use within specified fluid temperature range. g) Use within specified ambient temperature range. h) Do not touch the coil sections when energized or immediately after energizing. Directly touching these products could cause burns. i) Do not touch the wiring connection sections (bare live part) when energized. There is a risk of electric shock. j) Use within the maximum working pressure range.

⚠ CAUTION	a) Use within the maximum working pressure differential range. b) Instantaneous leakage When pressure is suddenly applied to a closed valve (for example, when a pump starts), the valve may open instantaneously and leak internally. This is because this product is pilot operated. It is not malfunction. Please note this event when this product is used. c) Do not apply pressure from the opposite port. Otherwise, the product may malfunction. d) Water hammer If water hammer occurs in your intended usage and is a problem, our “WHL type” “RSV type” solenoid valves, or our motor valves may solve your problem. Please contact us. e) Pressure differential Be sure to set the pressure differential of the primary and the secondary side of the valve above 0.02MPa. Pressure differential may decline considerably in the following cases: ・When flow of the secondary side is restricted. For example, by a nozzle. ・When several valves that are piped in parallel are opened at the same time. f) Do not use the product as footings, or place heavy loads on the product. g) If the product has not been used for more than a month, carry out trial run before work. h) If the product is not to be used for more than a month, remove water that is left in the valve completely. Otherwise, residual water induces rust, which will be a cause of malfunction and leakage. If it is impossible to remove residual water, convey water through the valve a few times to ensure maximum performance. i) Consult us if the product is to be energized continuously, or if the operation frequency is low. j) Beware of clogging of the strainer or filter.

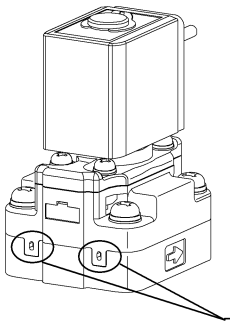
1) Refer to “6. Troubleshooting” if any trouble occurs.

4. 2. 1 Disassembly and assembly

⚠ CAUTION	a) Note the assembling direction of the Main Body and the Valve Body. Match the arrow direction on the bodies when assembling. b) Note the assembling direction of the Valve Body and the Stuffing. The Valve Body and the Stuffing are designed to prevent wrong assembling directions. c) Be sure to carry out trial run after re-assembly. Confirm that there is no malfunction and leakage.

1) Disassembly procedure ※Refer to fig. 4-3 in p.13 for an exploded view and part names.

- Detach Clip ① to disassemble Name Plate ② through Waving Washer ⑤(Excluding Screw ④).
- Unscrew Screw ④ to disassemble Holder ⑥ through O ring ⑨ from Stuffing Assembly ⑪.
- Unscrew Screw ⑩ to disassemble Stuffing Assembly ⑪ through Gasket ⑮ from Main Body ⑯.
  Note that Stuffing Assembly ⑪ and Valve Body ⑭ is temporarily assembled. Pull the Stuffing Assembly ⑪ and Valve Body ⑭ to disassemble. Be careful not to lose Main Valve ⑫ when doing so.



The pawl portion of Stuffing Assembly ⑪ is hooked onto Valve Body ⑭ (4 places).

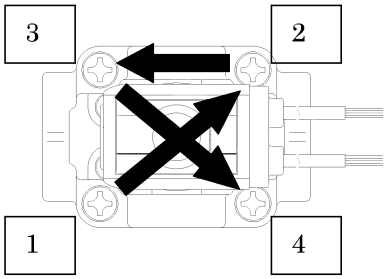
(Fig. 4-1)

2) Assembly procedure

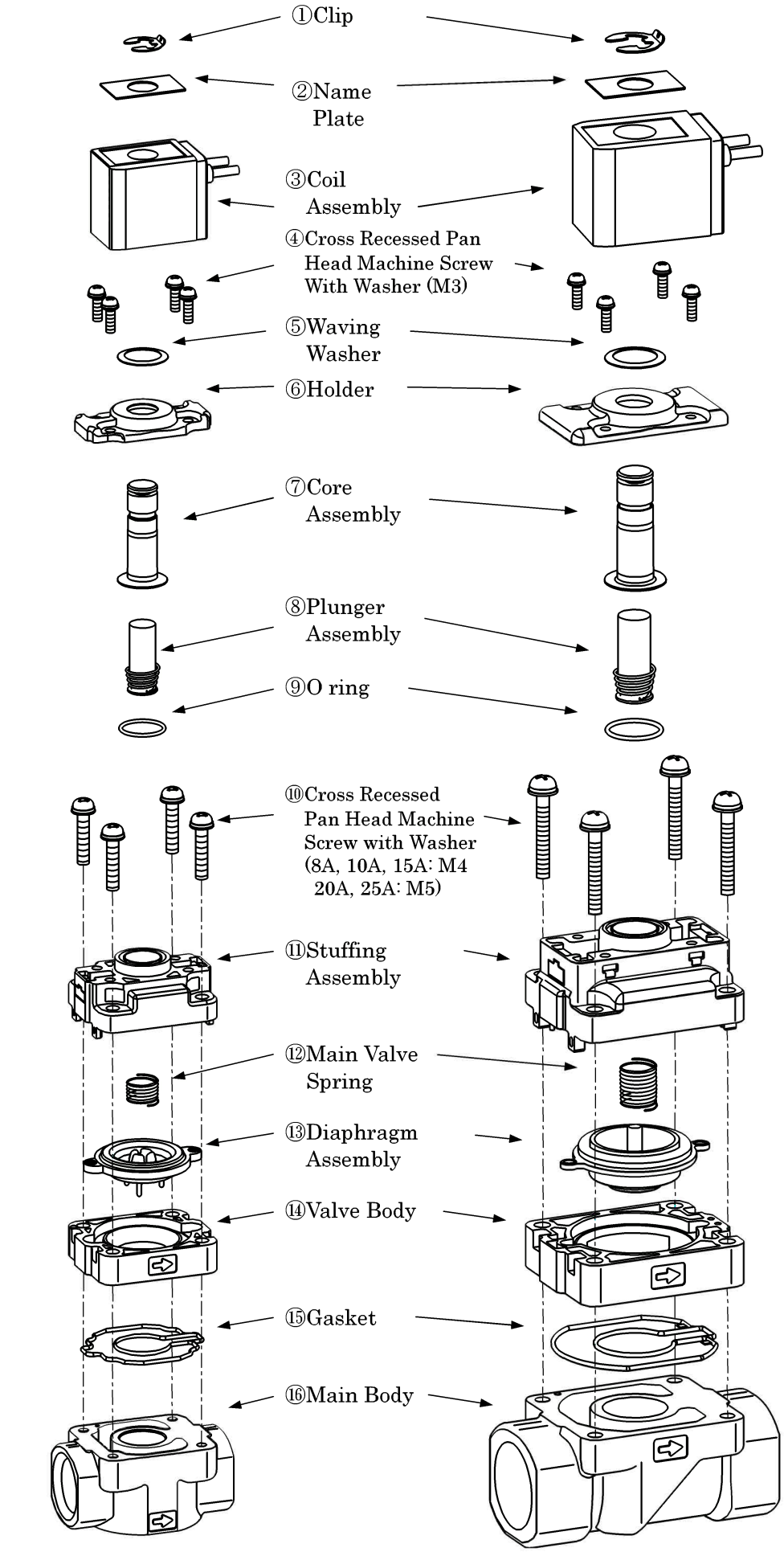
- Assemble the product with the opposite procedure to disassembling.
- Note the assembling direction of Valve Body ⑭ and Main Body ⑯.
  Match the arrow direction on the Valve Body and Main Body when assembling.
  Note) For brass body types with size 8A, 10A, and 15A only, the arrow appears on the body bottom side.
- Note the assembling direction of Stuffing Assembly ⑪ and Valve Body ⑭. They can be assembled only in a special direction.
- Confirm that Gasket ⑮ is inserted in the groove of Valve Body ⑭ firmly.
- After temporarily tightening Screw ④ and Screw ⑩, tighten them with the recommended torque shown in table 4-1. Tighten them equally and diagonally.

Table 4-1 Recommended screw tightening torque

Screw	Tightening torque(Nm)
Cross recessed pan head machine screw with washer (M3)	0.63-0.77
8A, 10A, 15A: Cross recessed pan head machine screw with washer (M4)	0.81-0.99
20A, 25A: Cross recessed pan head machine screw with washer (M5)	1.5-1.8



(Fig. 4-2)

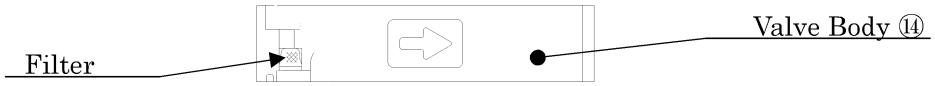


8A, 10A, 15A (Above is 15A)　　20A, 25A (Above is 25A)

(Figure 4-3)

4.2.2 To clean the Filter

If the valve malfunctions, it may because the filter clogged.
A Filter is built in Valve Body ⑭. Clean the Filter if it is clogged.
To disassemble and reassemble, refer to 4.2.1.



(Figure 4-4)

5. Maintenance

5. 1 Maintenance and inspection

⚠ CAUTION	Shut off the power supply and release the fluid and pressure before performing maintenance.

1) Read this Instruction Manual thoroughly and understand the contents before performing maintenance and inspection.
2) Regularly inspect the product to ensure optimum performance. The product should be inspected every half year.
3) Always carry out trial run if the valve has not been used for more than a month.
4) Refer to "3. Pre-operation check" for contents of inspection.
5) Cleaning the Filter

   A filter is built in this product.
   The purpose of this Filter is to prevent unexpected intrusion of foreign matter. It does not serve to prevent daily intrusion of foreign matter.
   To prevent foreign matter from intruding into the product, install a strainer (filter) 80 mesh or finer at the primary side of the valve.
   If the built-in Filter clogs, the product may not shut even when the product is de-energized, or the product may take longer to shut than usual.
   Clean the Filter if it clogs.

   Refer to "6. Troubleshooting" if there are any abnormalities.

6. Troubleshooting

1) Perform inspection when power fails, or at emergencies such as malfunction.

2) If the product does not operate as intended, inspect the product following the table below.

State of failure	Cause	Countermeasure
Valve does not open	Valve is not energized.	Confirm wiring and fuse, then energize the valve.
	Voltage applied is lower than the allowable voltage range.	Confirm the power supply, and apply rated voltage.
	Fluid pressure applied is beyond the value specified.	Adjust the pressure within the specified value.
	Foreign matter clogs the flow.	Disassemble and clean the product interior.
	Foreign matter obstructs operation at the actuator portion.	Disassemble and clean the product interior.
	The Diaphragm Assembly is damaged.	Replace the product.
Valve does not shut	Valve is not de-energized.	Check for electric leakage. Modify the circuit so the power is shut off for sure.
	Fluid pressure applied is beyond the value specified.	Adjust the pressure within the specified value.
	Foreign matter is caught in the valve seat.	Disassemble and clean the product interior.
	Foreign matter obstructs operation at the actuator portion.	Disassemble and clean the product interior.
	The Diaphragm Assembly is damaged.	Replace the product.
	The Filter is clogged.	Clean the Filter.
External leakage	The Diaphragm Assembly is damaged or deformed.	Replace the product.
	The Gasket is damaged or deformed.	Replace the product.
Internal leakage	Pressure applied is beyond the value specified.	Adjust the pressure within the specified value.
	The valve seat of the Body is worn or damaged.	Replace the product.
	The sealing side of the Diaphragm Assembly is worn or damaged.	Replace the product.
	Foreign matter is caught in the valve seat.	Disassemble and clean the product interior.

3) Please consult CKD or your nearest agent for any unclear points.

7.Product specification and model number display

7. 1 Product specification

Specifications

Descriptions		FWD11-8A	FWD11-10A	FWD11-15A	FWD11-20A	FWD11-25A
Actuation		NC (normally closed)				
Working fluid		Water (other than sewage, agricultural water, liquid manure, antifreeze)				
Working pressure differential range	MPa	0.02 to 0.7				
Max. working pressure	MPa	0.7				
Pressure resistance (water)	MPa	1.05				
Fluid temperature	℃	5 to 60 (no freezing)				
Ambient temperature	℃	−10 to 60 (no freezing of fluid)				
Atmosphere		Area without corrosive or explosive gases				
Valve structure		Pilot operated poppet structure diaphragm structure				
Valve seat leakage	cm^3/min	0 (water pressure) (Note 1)				
Installation attitude		Free				
Protection property		IPX5				
Port size		Rc1/4	Rc3/8	Rc1/2	Rc3/4	Rc1
Orifice	mm	15 (Note 2)			22 (Note 2)	
Cv flow factor		2.8	4.2	6.0	11.0	12.0
Weight	g	340	320	390	730	950
Rated voltage		100VAC 50/60Hz, 200VAC 50/60Hz, 24VDC				
Allowable voltage fluctuation		Rated voltage ±10%				
Apparent power	VA	At holding (50/60Hz): 5/4, at starting (50/60Hz): 9/8			At holding (50/60Hz): 9.5/7, at starting (50/60Hz): 23/20	
Power consumption	W	AC(50/60Hz): 2.7/2, DC: 4			AC(50/60Hz): 4/3.2, DC: 4	
Coil heat resistance class		B				

Note 1: "Valve seat leakage 0 cm^3/min" means that no water drip leaks for a minute.
Note 2: Orifice diameter refers to the diameter of the valve seat section.

7.2 Model number display

How to order

FWD11 - 15 A - 0 2GS B - AC100V

Model no.
Ⓐ Port size
Ⓑ Thread type
Ⓒ Body/sealant combination
Ⓓ Coil option
Ⓔ Mounting plate
Ⓕ Rated voltage Note 2

Symbol	Description	
Ⓐ Port size		
8	1/4	
10	3/8	
15	1/2	
20	3/4	
25	1	
Ⓑ Thread type		
A	Rc	
G	G	
N	NPT	
Ⓒ Body/sealant combination		
	Body	Seal
0	Brass / PPS (Port size: 8,10,15) Bronze / PPS (Port size: 20,25)	NBR
D	Stainless steel/ PPS	NBR
Ⓓ Coil option		
2C	Grommet lead wire	
2CS	Grommet lead wire with surge suppressor	
2G	With DIN terminal box	(Note 1)
2GS	DIN terminal box / with surge suppressor	(Note 1)
2H	DIN terminal box with light	(Note 1)
2HS	DIN terminal box and light, surge suppressor	(Note 1)
Ⓔ Mounting plate		
Blank	None	
B	Mounting plate (Port size: only 8,10,15 are available)	
Ⓕ Rated voltage		
AC100V	100VAC 50/60Hz, 110VAC 60Hz	
AC200V	200VAC 50/60Hz, 220VAC 60Hz	
DC24V	24VDC	

Note on model no. selection

Note 1: For port size 8, 10, 15; refer to Pg 9.
For port size 20, 25; refer to Pg11.
Note 2: The rated voltage includes 110VAC 50/60 Hz and 220VAC 50/60 Hz. Contact CKD for more information.

<Example of model number>

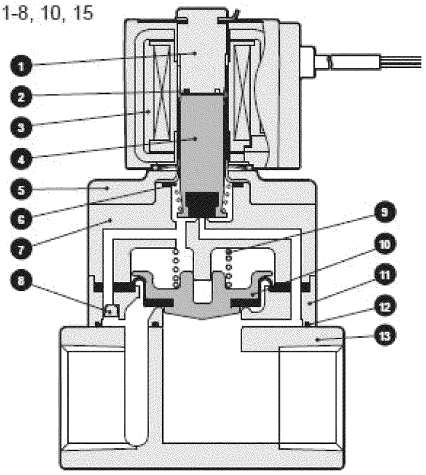
FWD11-15A-02GSB-AC100V

Ⓐ Port size : 1/2
Ⓑ Screw type : Rc screw
Ⓒ Body/sealant combination : Brass / PPS, NBR
Ⓓ Coil option : DIN terminal box with surge suppressor (pg 9)
Ⓔ Mounting plate : Mounting plate
Ⓕ Rated voltage : 100VAC 50/60 Hz, 110VAC 60 Hz

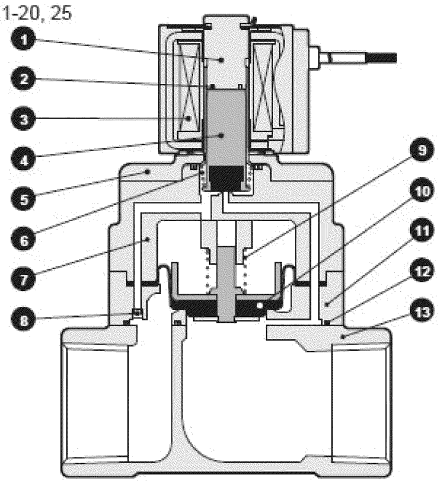
8. Internal construction

Internal structure and parts list

● FWD11-8, 10, 15



● FWD11-20, 25



No.	Parts name	Material		No.	Parts name	Material	
1	Core assembly	SUS	Stainless steel	8	Filter	SUS	Stainless steel
2	Shading coil ∗1	Cu (Ag for stainless steel body)	Copper (Silver for stainless steel body)	9	Valve spring	SUS	Stainless steel
3	Coil	–	–	10	Diaphragm assembly	Port size: 8,10,15; PPS/NBR	Polyphenylene sulfide/ nitrile rubber
4	Plunger	SUS・NBR	Stainless, nitrile rubber			Port size: 20, 25; SUS/NBR	Stainless steal/ nitrile rubber
5	Holder plate	PPS	Polyphenylene sulfide	11	Valve body	PPS	Polyphenylene sulfide
6	Plunger spring	SUS	Stainless steel	12	Gasket	NBR	Nitrile rubber
7	Stuffing Assembly	PPS・SUS・NBR	Polyphenylene sulfide/ stainless steal/ nitrile rubber	13	Main body	Port size: 8, 10, 15; C3771 (SCS13)	Brass (stainless steel)
						Port size: 20, 25; CAC408 (SCS13)	Bronze (stainless steel)

Items inside parentheses are optional

Note: Material of thread is steel.

∗1: Shading coil will not be used for DC coil.