CKD

SM-8275-A/4

INSTRUCTION MANUAL

Multilex Valve
AB71 Series

- Read this manual carefully and thoroughly before using this product.
- In particular, read the safety notes carefully.
- Retain this instruction manual with the product for further consultation whenever necessary.

4th edition

CKD

For safety use

When designing and manufacturing equipment using our products, you are obligated to confirm that the safety of the system operated by the mechanical mechanism of the equipment, the pneumatic control circuit or the water control circuit, and the electrical control that controls these circuits can be ensured, and to manufacture safe equipment.
To use our products safely, it is important to select, use, and handle the products, as well as to maintain and manage them properly.
To ensure the safety of the equipment, be sure to observe all warnings and precautions.
We ask that you confirm that safety can be ensured in your equipment and that you manufacture safe equipment.

⚠ WARNING

1. This product is designed and manufactured as equipment and part for general industrial machinery.
Therefore, handling should be performed by persons with sufficient knowledge and experience.

2. Be sure to use the product within the product specifications.
It cannot be used outside of product-specific specifications. Never modify or perform any additional work on the product.
This product is intended for use in general industrial equipment and parts. Therefore, it is not applicable when used outdoors or in the following conditions or environments.
(However, if you consult with us before adopting the product and agree with our product specifications, it is applicable, but please take safety measures to avoid danger in the unlikely event of malfunction.)
[1] Use in applications requiring safety, such as atomic energy, railways, aviation, ships, vehicles, medical machinery, equipment and applications in direct contact with beverages or food, recreational equipment, emergency shutdown circuits, press machines, brake circuits, and safety measures.
[2] Use in applications that are expected to have a significant impact on people and property and require special safety.

3. Be sure to observe all organization safety standards, laws and regulations, etc. related to equipment design, management, etc.
ISO4414, JIS B 8370 (General Rules for Pneumatic Systems)
JFPS2008 (Guidelines for the Selection and Use of Pneumatic Cylinders)
High Pressure Gas Safety Act, Industrial Safety and Health Act and other safety regulations, organization standards, laws and regulations, etc.

4. Do not handle this product or remove any piping or equipment until you are sure of its safety.
[1] Before inspecting or maintaining machines or equipment, be sure to confirm that all systems involving this product are safe.
[2] Even when the operation is stopped, there may be hot or charged parts present, so please be careful.
[3] When inspecting and maintaining equipment, shut off the supply air and supply water as energy sources and the power to the relevant equipment, exhaust any compressed air in the system, and take care to avoid water leaks and electrical leaks.
[4] When starting up or restarting a machine or equipment that uses pneumatic equipment, confirm that the safety of the system, including measures to prevent ejection, is ensured.

5. To prevent accidents, be sure to observe the warnings and precautions on the following pages.

■ **The precautions shown here are classified into three safety precaution levels: "Danger," "Warning," and "Caution."**

⚠ **DANGER**	:	Failure to pay attention to DANGER notices may cause a situation that results in a fatality or serious injury and that requires urgent addressing.
⚠ **WARNING**	:	Failure to pay attention to WARNING notices may result in a fatality or serious injury.
⚠ **CAUTION**	:	Failure to pay attention to CAUTION notices may result in injury or damage to equipment or facilities.

Precautions classified as "CAUTION" may still lead to serious results depending on the situation.
All of the above are important information and must be followed.

Warranty notice

- **Warranty Period**
  This product is warranted for one (1) year from the date of delivery to the location specified by the customer.

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

  [1] Handling or use under conditions or environments other than those described in the catalog or specifications
  [2] Failure not caused by the product.
  [3] When the product is used in a manner other than its intended use.
  [4] Failure caused by modifications/alterations or repairs not carried out by CKD.
  [5] Failure caused by reasons unforeseen at the level of technology available at the time of delivery.
  [6] Failure caused by a natural disaster or other disaster that is not our responsibility.

  Please note that the warranty here applies to the delivered product alone and excludes any damages caused by defects in the delivered product.

- **Confirmation of product compatibility**
  It is the customer's responsibility to verify adaptability of our products with the system, machines, and equipment used by the customer.

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1. How to open packaging

CAUTION	Do not remove the packaging bag until just before piping. If the packaging bag is removed before ready to begin piping, foreign matters may enter the inside from the piping ports and cause a failure or malfunction.

(1) Check that the model number ordered and the model number indicated on the product nameplate are the same.
(2) Check the appearance for any damage.
(3) When storing the product, keep it in the individual packaging box to prevent foreign matters from entering the product, and remove it from the box when piping.

2. Installation method

WARNING	For use outside the specified specifications or for special applications, consult with us regarding the specifications.

2.1 Environment

WARNING	a) Cannot be used in explosion-proof atmosphere. ・When used in an explosion-proof atmosphere, select an explosion-proof solenoid valve or air-driven valve. b) When used with AC voltage, a growling sound may be generated depending on the operating conditions. ・If the operating environment causes a growling noise problem, select a coil with an internal diode. c) Do not use in an atmosphere that contains corrosive gases and/or damages the constituent materials. d) Do not use the product near a heating element or in a location subject to radiant heat. e) Use within the ambient temperature range. f) If the fluid freezes, the product may be damaged. Take appropriate anti-freeze measures. When insulation is applied to the solenoid valve, do not apply it to the coil section. This may cause coil burnout. g) Install the product away from rain, water, direct sunlight and direct UV exposure. Cannot be used outdoors. h) Take appropriate protective measures in locations exposed to oil, welding spatter, etc.

CAUTION	a) Install and use the product in a vibration-free location.

2.2 Installation method

2.2.1 Installation

CAUTION	a) Read the instruction manual carefully and understand the contents before installing the product. b) When handling and installing the product, be sure to grasp the main body. Do not apply external force to the coil section. c) Install the product so that no tensile force is applied to the coil section lead wires. d) When carrying the product, hold the product main body. Do not hold the lead wire in a dangling position. e) After installation, check for piping leaks and confirm correct installation.

(1) The installation posture is limited to the range of vertical to horizontal installation with the coil up.

2.2.2 Maintenance space

・ Secure sufficient space for safe operations during maintenance and troubleshooting.

2.3 Piping method

CAUTION	a) When tightening or re-tightening piping, fix the product in place. Be sure to grab the main body for fixation. b) Fix and support the piping so that the weight and vibration of the piping is not applied directly to the valve. c) When connecting the piping, tighten it with the recommended torque (see Table 2-1). d) Make sure the piping is screwed in to the effective thread length. Chamfer the tip of the screw by about half a pitch. e) Before piping, perform flushing with air at 0.3 MPa or higher to remove dust, metal powder, rust, sealing tape, and other foreign matters. f) Excessive use of sealant (sealing tape or jelly sealant) during piping may cause enter of sealant into the product and cause malfunction. g) When applying or wrapping sealant around the piping materials, apply or wrap it leaving 1.5 to 2 threads from the pipe end. h) Debris and foreign matters in the fluid can interfere with the proper functioning of the product. Install a strainer (filter) of at least 80 meshes in front of the product. i) When connecting piping to the product, make sure that the supply ports, etc. are correct. j) Install a bypass circuit to facilitate maintenance and repair work and make piping using unions. k) When controlling the fluid in the tank, piping should be slightly above the bottom of the tank.

(1) Cleaning of piping materials

・ Before piping, perform flushing with air at 0.3 MPa or higher to remove dust, metal powder, rust, sealing tape, and other foreign matters.

(2) Removal of foreign matter

・ Debris and foreign matters, etc. in the fluid can cause malfunction or valve seat leakage. Install a strainer (filter) of at least 80 meshes just before the product.

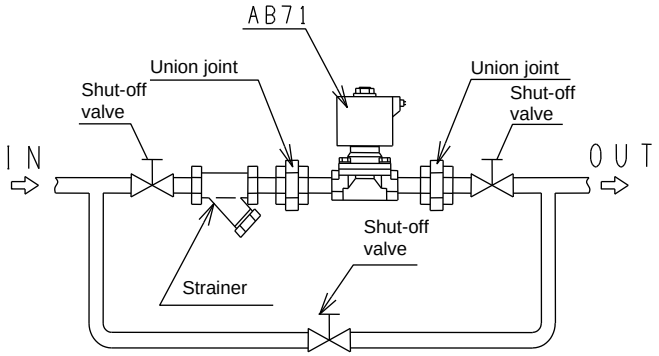
(3) Piping

・ Be sure to grab the main body for piping.

・ Fix the product with a piping support or mounting plate.

・ When controlling the fluid in the tank, piping should be slightly above the bottom of the tank.

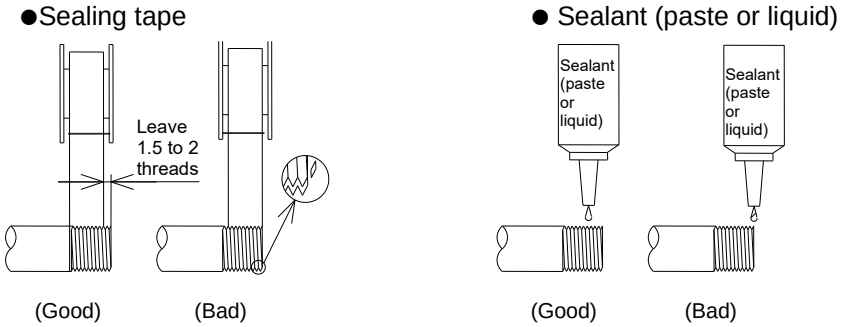
For piping, we recommend the example shown in the figure below.



(Figure 2-1)

(4) Sealant

・ When using sealant, be careful not to allow it to enter the piping and ensure that there is no external leakage. When wrapping the sealing tape around the screw, leave 1.5 to 2 threads at the tip of the screw. (Fig. 2-2) When using liquid sealant, apply it not too much, leaving 1.5 to 2 threads at the tip of the screw. Do not apply it to the female thread side of the product.



(Figure 2-2)

(5) Tightening

・ Refer to Table 2-1 for tightening torque when piping.

Table 2-1 Recommended tightening torque for main port piping

Nominal diameter of piping	Recommended piping tightening torque
Rc1/2	41 to 43 [N•m]
Rc3/4	62 to 65 [N•m]
Rc1	83 to 86 [N•m]

2.4 Wiring method

CAUTION

a) Always operate the product within the allowable voltage range. Use outside the allowable voltage range may cause malfunction or coil damage.
b) Use a circuit breaker such as a fuse on the control circuit side for the preservation of electrical equipment.
c) If the electrical circuit system is susceptible to solenoid surges, insert a surge absorber, etc. into the solenoid in parallel.
d) Use wires with the nominal cross-sectional area of about 0.5 mm^2 or more for wiring.
e) The use of a switching circuit that does not cause contact chattering makes the solenoid valve more durable.
f) When using a non-contact relay circuit, make sure that the leakage current is within the following specifications.

Rated voltage	Leak current
AC coil	15% or less of rated current
DC coil	1% or less of rated current

(1) Lead wire type wiring method

This product uses the following lead wires.

When crimping, crimp under the appropriate crimping conditions to ensure proper insulation.

Conductor size	Insulator outer diameter
AWG20	φ2.7 mm

This product has no polarity even in the case of DC.

(2) Wiring method for DIN terminal box type

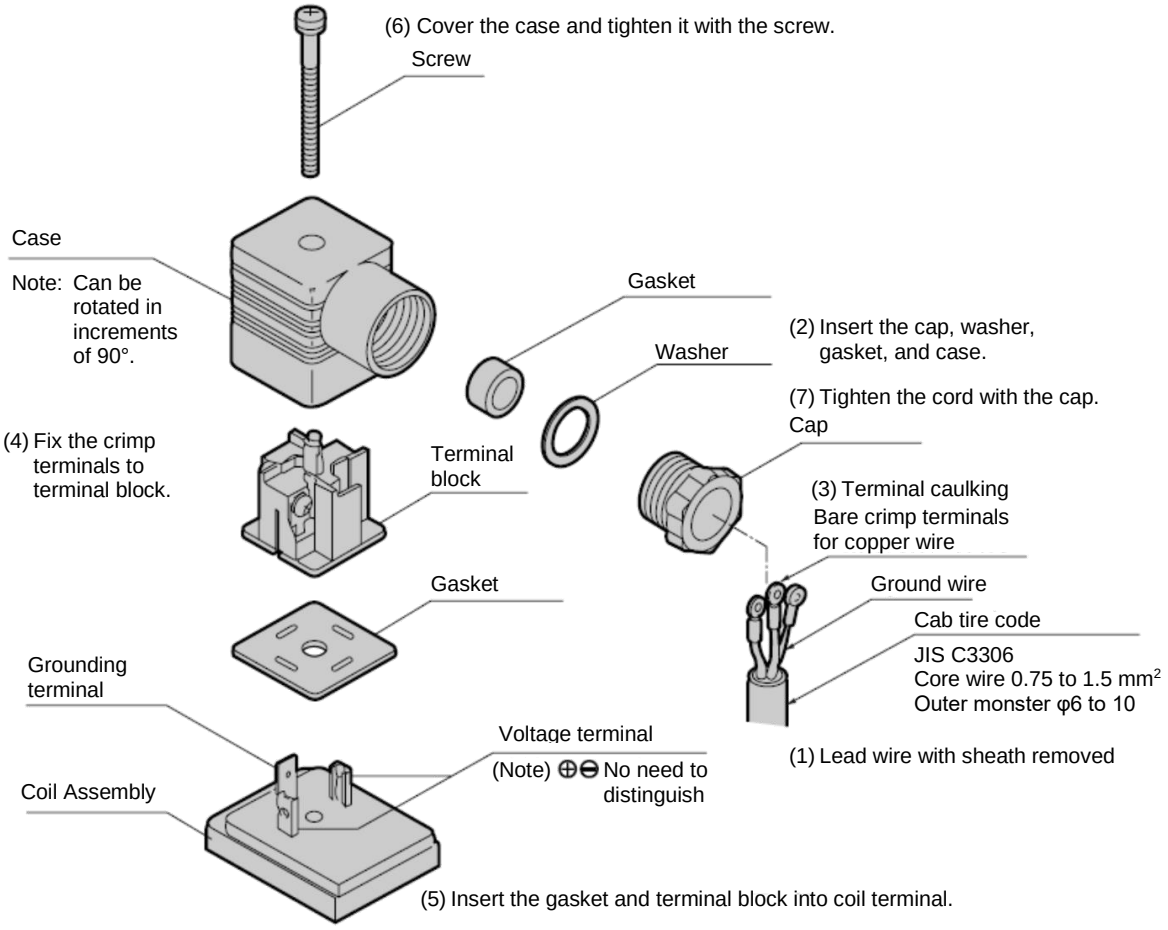
・ Use the following cab tire cord.

Code outer diameter	Nominal cross-sectional area
φ6 to 10 mm	0.5 to 1.5 mm^2

・Crimp the crimp terminal for copper wire to the lead wire of the cab tire cord.
The terminal box terminal screw size is M3.

・Tighten the screws with the following torque.

Terminal box mounting screw	Terminal screw
0.5 Nm	0.5 Nm



Follow the work procedure from (1) to (7).

*** The direction to take out the cord can be changed by removing the terminal block from the case, rotating it in increments of 90°, and pushing it back into the case again.**

(Figure 2-3)

(3) HP terminal box type wiring method

・Use the following cab tire cord.

Nominal cross-sectional area
0.5 mm² or more

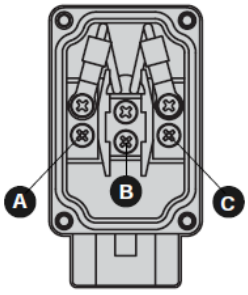
・Crimp the crimp terminal for copper wire to the lead wire of the cab tire cord. The terminal box terminal screw size is M3.

・Tighten the screws with the following torque.

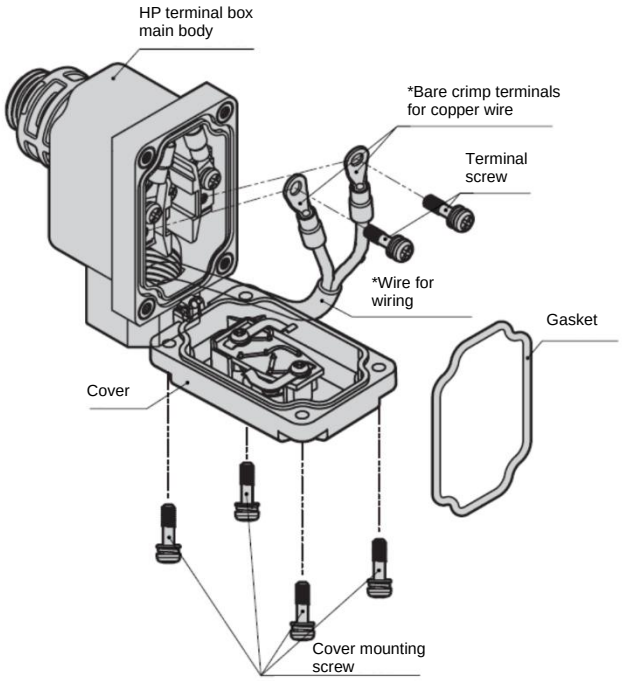
Terminal box mounting screw	Terminal screw
0.5 Nm	0.5 Nm

・Wire to the terminals A and C on the terminal board.

In the case of the terminal box with lamp and DC voltage, wiring should be made as follows: terminal A of terminal board: ⊖ pole, terminal C: ⊕ pole.



(Figure 2-4)



The parts marked with * are not included in our products.

(Figure 2-5)

3. Check before use (Check after construction)

3.1 Appearance check

WARNING	Stop the flow of the fluid. (Close the main valve.) Vent the fluid in the product. Turn off the power.

(1) Check that the product is securely fastened to the piping by pressing it by hand.
(2) Make sure that the piping is secure.
(3) Make sure that no threaded parts are loose.
(4) Make sure that the wiring is correct.

3.2 Leakage check

(1) Keep the fluid pressurized and check for leaks at the connections.
It is recommended to check leakage by supplying compressed air (0.3 to 0.5 MPa), applying soap solution, and checking if bubbles are generated.

3.3 Electricity check

WARNING	Turn off the power. Check with caution to avoid electric shock.

(1) Check the power supply voltage.
Voltage fluctuations should be within ±10% of the rated voltage.
Use outside the allowable voltage range may cause malfunction or coil damage.
(2) Check the insulation resistance.
Measure the insulation resistance between the non-charged metal parts such as the screw parts assembled in the product and the charged metal parts such as the lead wires.
Check that the value is 100 MΩ or higher at DC1000V megger.

4. Proper operation

4.1 Precautions for use

WARNING

a) Cannot be used for emergency shutoff valves, etc.
   - It is not designed as an emergency shutoff valve or other safety assurance valves. For such a system, use the valve after taking other measures to ensure safety.

b) Take necessary measures in advance to prevent any adverse effects on people or objects in the event of a malfunction of this product.

c) About liquid sealing
   - When flowing liquid, if the circuit is liquid-sealed, the pressure may increase due to temperature change, and it may not operate. Provide a relief valve on the system to avoid a liquid-sealed circuit.

d) Working fluid
   - Note that wear and tear of internal parts during valve operation may generate wear particles that flow to the secondary side of the valve.

e) Foreign matters such as iron rust and dust in the fluid can cause malfunctions and leakage, and interfere with product performance. Use only after taking measures to eliminate them.

f) Use it within the specified fluid temperature range.

g) Use it within the specified ambient temperature range.

h) Do not touch the coil section with your hands and/or body during and immediately after energizing.
   The coil section of the solenoid valve generates heat when electricity is applied. Direct contact may cause burns.

i) Do not touch the electrical wiring connections (bare charging section) with your hands and/or body when energized. Doing so will cause an electric shock.

j) Use it within the maximum working pressure.

CAUTION

a) Use it within the specified pressure differential range.

b) Do not apply reverse pressure. It may result in malfunction.

c) About Water hammer
   If you have a problem with water hammer, consider using our "FWD type" or "RSV type" solenoid valve or motor valve.

d) Do not use the product as a scaffold or place heavy objects on it.

e) If the product has not been used for one month or more, perform a trial run before the start of the work.

f) If it will not be used for one month or more, completely remove residual water inside. Residual water may cause rust, resulting in malfunction and leakage.
   If the residual water cannot be removed, flow water several times a day for optimum use.

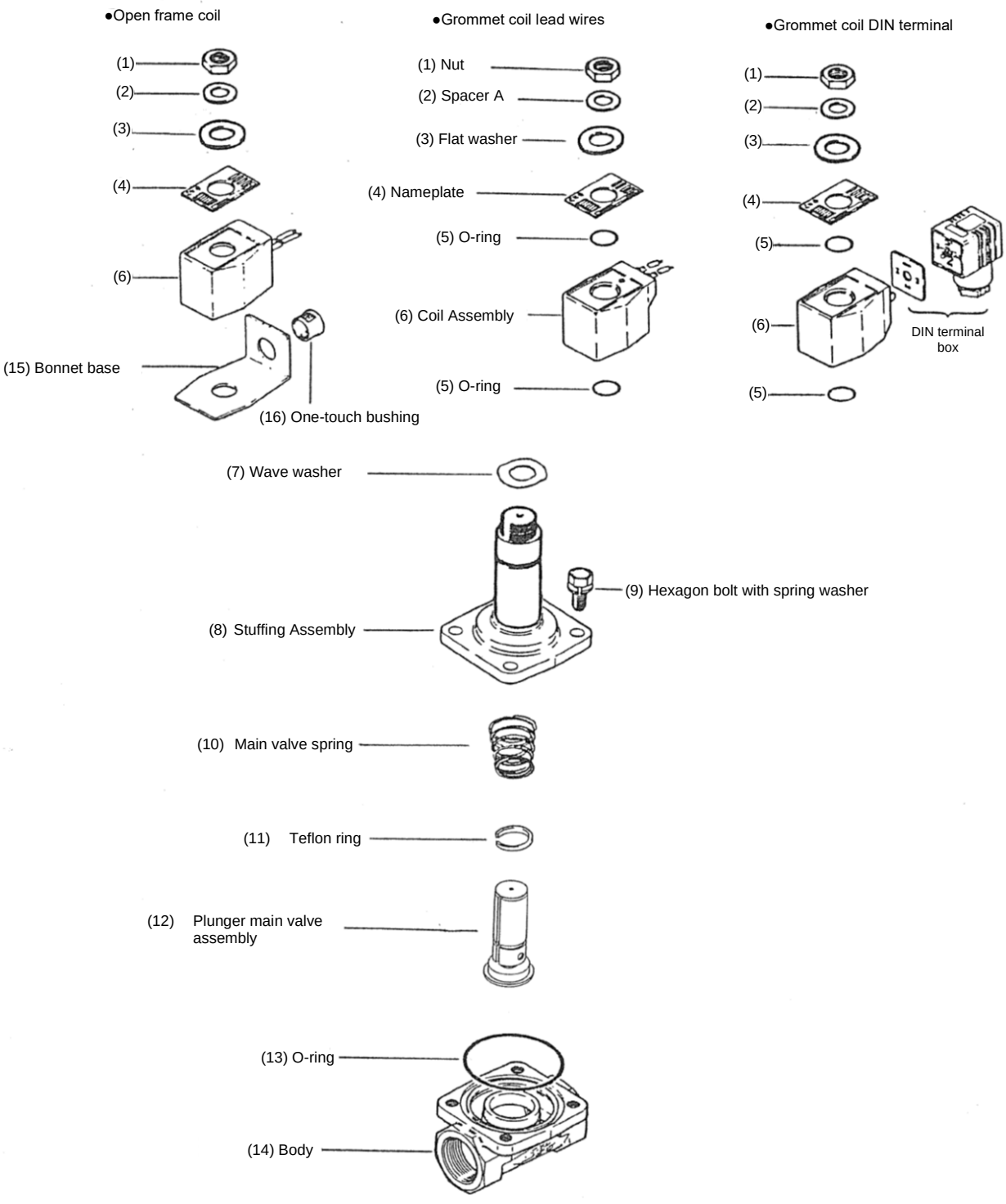
g) For continuous power supply or low frequency use, contact us.

h) Be careful not to clog the strainer (filter).

(1) If any abnormality occurs, see "6. Failures and troubleshooting."

4.2 Disassembly and assembly

⚠ **CAUTION**	a) Stop the flow of the fluid. (Close the main valve.) b) Vent the fluid in the valve. c) Turn off the power.



(Figure 4-1)

4.2.1 Disassembly procedure

(1) Always turn off the power and release the fluid and pressure before disassembling.
(2) Loosen the nut (1), and the spacer A (2), flat washer (3), nameplate (4), coil assembly (6), bonnet base (15), and wave washer (7) can be removed.
(3) Remove the four hexagonal bolts (9) to separate the stuffing assembly (8) from the body (14) and remove the plunger main valve assembly (12) and main valve spring (10). Be careful not to lose the main valve spring (10) at this time.

4.2.2 Assembly procedure

(1) Assemble in the opposite order of disassembly.
(2) Be careful not to forget to assemble parts.
(3) When the stuffing assembly (8) is assembled to the body (14), the direction is not specified for IN and OUT, but there is a long and short direction between the four bolts.
(4) Tighten the screws with the tightening torque shown in Table 4-1.

Table 4-1 Recommended screw tightening torque

Part name		Tightening torque
Hexagonal bolt (9)	AB71-15, AB71-20	5 to 7 N･m
	AB71-25	9 to 12 N･m
Nut (1)		8 to 16 N･m

5. Maintenance

5.1 Maintenance and inspection

⚠ **CAUTION**	Always turn off power and release the fluid and pressure before maintenance.

(1) Before performing maintenance or inspection, please read and understand the instruction manual carefully.
(2) To operate the product in its optimal operating state, carry out the periodic inspection normally once every six months.
(3) If the product has not been used for one month or more, perform a trial run before the start of the work.
(4) Refer to "3. Check before use" for inspection details.

5.2 Maintenance parts

(1) Plunger main valve assembly, O-ring
Replace these parts when any abnormality such as leakage or sticking phenomenon or delay of the valve section is observed during use.

6. Failures and troubleshooting

(1) In the event of a power failure or an emergency such as operational abnormality, perform the inspection operation.

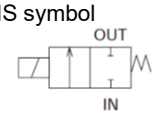
(2) If the product does not operate as intended, check the table below for a possible solution.

Failure condition	Cause	Solution
The valve does not open.	Electricity is not energized.	Check the wiring, fuses, etc., and turn on the power.
	The power supply voltage is below the rated voltage.	Check the power supply and enter the rated voltage.
	The fluid pressure is outside the pressure range of the specification.	Adjust it within the specified pressure range.
	Foreign matters are clogging the flow path section.	Disassemble and clean the inside of the product.
	Foreign matters are entrapped in the actuator section.	Disassemble and clean the inside of the product.
The valve is not closed.	The electricity is not turned off.	Check for leakage current, etc., and modify the circuit to ensure that the power supply is cut off.
	The fluid pressure is outside the pressure range of the specification.	Adjust it within the specified pressure range.
	Foreign matters are clogged in the valve seat.	Disassemble and clean the inside of the product.
	Foreign matters are entrapped in the actuator section.	Disassemble and clean the inside of the product.
	The main valve spring is damaged.	Replace the main valve spring.
External leakage	Foreign matters are clogged in the sealing section.	Disassemble and clean the inside of the product.
	O-ring is damaged or deformed.	Replace the O-ring.
Internal leakage	The operating pressure is outside the pressure range of the specification.	Adjust it within the specified pressure range.
	The valve seat of the body is worn/scratched.	Replace the product.
	The sealing surface of the main valve is worn or scratched.	Replace the plunger main valve assembly.
	Foreign matters are clogged in the valve seat section.	Disassemble and clean the inside of the product.

(3) If you have any other questions or concerns, contact our sales office or distributor.

7. Product specifications and model number coding

JIS symbol



Specifications

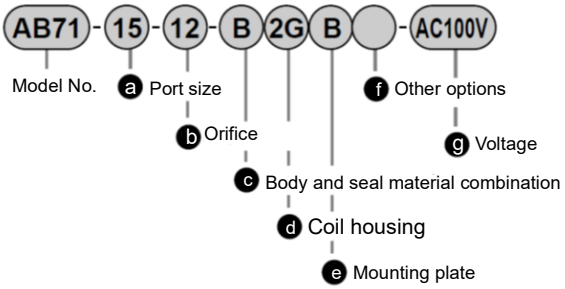
Item		AB71-15-12	AB71-20-15	AB71-25-18
Working fluid		Air, water, kerosene, oil (20 mm^2/s)		
Operating pressure range kPa	Air	AC: 0 to 100, DC: 0 to 80	AC: 0 to 70, DC: 0 to 40	AC: 0 to 40, DC: 0 to 30
	Water, kerosene, oil	AC: 0 to 80, DC: 0 to 80	AC: 0 to 50, DC: 0 to 40	AC: 0 to 30, DC: 0 to 30
Withstand pressure (water pressure) MPa		1		
Fluid viscosity mm^2/s		20 or less		
Fluid temperature °C		-5 to 60 (no freezing)		
Ambient temperature °C		-10 to 60		
Valve seat leakage cm^3/min (ANR)		0.2 or less (in air)		
Port size		Rc1/2	Rc3/4	Rc1
Orifice diameter mm		12	15	18
Mounting orientation		It is limited to the range of vertical to horizontal installation with the coil up.		
Electrical Specifications				
Rated voltage		100 VAC 50/60 Hz, 200 VAC 50/60 Hz, 110 VAC 60 Hz, 220 VAC 60 Hz, 12 VDC, 24 VDC, 48 VDC, 100 VDC		
Apparent power VA	During standby (50/60 Hz)	32/26		
	During startup (50/60 Hz)	123/106		
Power consumption W		AC: 13/11 (50/60 Hz), DC: 20		

Flow rate characteristics

Model No.	Port size	Orifice diameter (mm)	Flow rate characteristics			
			C [$dm^3/(s \cdot bar)$]	b	Cv value	S (mm^2)
AB71-15-12	Rc 1/2	12	15	0.21	2.8	-
AB71-20-15	Rc 3/4	15	-	-	4.3	106
AB71-25-18	Rc 1	18	-	-	63	148

*1 The conversion between the effective cross section S and the sound velocity conductance C is $S \approx 50 \times C$.

MODEL NUMBER CODING



Code	Description
a Port size	
15	Rc1/2
20	Rc3/4
25	Rc1
b Orifice	
12	φ12 (AB71-15 [port size Rc1/2] only)
15	φ15 (AB71-20 [port size Rc3/4] only)
18	φ18 (AB71-25 [port size Rc1] only)

c Body and seal material combination

	Body	Stuffing	Seal	Processing
B	Bronze	Brass	Fluoro-rubber	-
J	Bronze	Brass	Fluoro-rubber	Oil-prohibited treatment

<Example of model number indication>

AB71-15-12-B2EB-AC100V

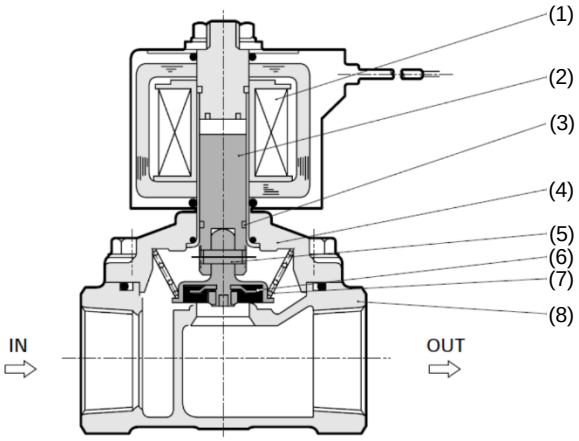
Model name: AB71

- a Port size: Rc1/2
- b Orifice: φ12
- c Body and seal material combination
  : Body - bronze, stuffing - brass, seal - fluorine rubber
- d Coil housing: with DIN terminal box (G1/2)
- e Mounting plate: Present
- f Other options: None
- g Rated voltage: 100 VAC 50/60 Hz, 110 VAC 60 Hz

d Coil housing				e	f Other options					g Rated voltage
Description				Mounting plate	Cable grant (Wire penetration hardware for ships)			Conduit (Conduit piping)		Description
					A-15a	A-15b	A-15c	CTC19	G1/2	
2C	Standard	Grommet lead wire		**B**						100 VAC, 200 VAC
2E	Option	With DIN terminal box	(G1/2)							
2G		With DIN terminal box	(Pg11)							
2H		DIN terminal box with small lamp	(Pg11)						**H**	
3A		Open frame type	Lead wire	**B**				**G**	**H**	100 VAC, 200 VAC 12 VDC, 24 VDC, 48 VDC, 100 VDC
3M			With HP terminal box (G1/2)		**D**	**E**	**F**			
3N			With HP terminal box with lamp (G1/2)							100 VAC, 200 VAC, 24 VDC, 100 VDC
5A		Open frame type (with built-in diode)	Lead wire	**B**				**G**	**H**	100 VAC, 200 VAC
5M			With HP terminal box (G1/2)		**D**	**E**	**F**			
5N			With HP terminal box with lamp (G1/2)							

For the items ⓓ through ⓖ the combination with the symbols filled in can be produced.
However, if the options in the items ⓔ and ⓕ are not required, no symbols are filled in.

8. Inside structure drawing



Part No.	Part name	Material	
1	Coil	----	----
2	Plunger	SUS405	Stainless steel
3	Wear ring	PTFE	Tetrafluoroethylene resin
4	Stuffing assembly (Core assembly section)	C3771	Brass
		SUS405, Cu	Stainless steel, copper
5	Spring pin	SUS420	Stainless steel
6	Main valve	SUS304, FKM	Stainless steel, Fluorine rubber
7	Main valve spring	SUS304	Stainless steel
8	Body	CAC407	Bronze