CKD

SM－50588－A

INSTRUCTION MANUAL

VALVE OPERATION BOX FOR PULSE JET VALVE

PJVB 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.**
   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 falure 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 chargeat 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 agrees with that you ordered.
(2) Check that the rated voltage and frequency meet your specification.
(3) Check that the product has no external damages.
(4) 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) Do not splash fluids such as water or cutting oil directly. ・Fluids (such as water or cutting oil) splashed onto the coil part of the pilot solenoid valve causes the coil to burn. b) Coil generates heat. ・If the product will be installed in a control panel, of if the product will be energized for a long time, provide measures such as ventilation to release heat. The product temperature will be high. c) The product cannot be used in a corrosive or solvent atmosphere. d) Avoid using the product in a humid atmosphere, since change in temperature may cause bedewing. e) The product cannot be used in an explosive gas atmosphere. f) Use the product away from radiant heat.

(1) When using the valve in a cold district, an proper provision is required to prevent freezing of the valve.
(2) This valve is intended for both indoor and outdoor use.
If the valve is used in outdoors, a metal fitting for the electric wire take-out port suitable for the operating environment shall be selected.
(3) The protective structure of this valve conforms to IP64. However, the electric wire take-out port is not protected. A waterproof metal fitting shall be used for this port. To attach the cover, the cover is press-fit so that it is in contact with the sub-plate, and then it is secured with a catch-clip. If the cover is not press-fit completely (stopped halfway), the protective structure does not show the optimal level.
(4) If salt hazard is predicted, paint the valve appropriately to prevent salt hazard.

2.2 Installation

2.2.1 Installation

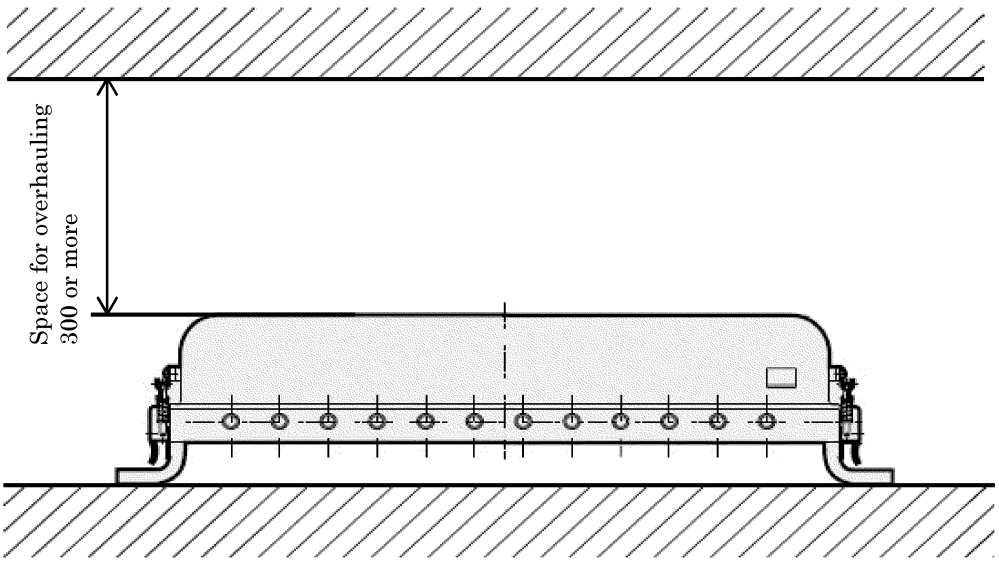
⚠ CAUTION	a) Always thoroughly read the Instruction Manual before installing this product. b) Always hold the sub-plate when handling or installing the product. c) After installing, check for leak from the pipe and make sure that the product is correctly installed.

(1) The valve is used with the cover faced upward.

(2) The valve cannot be used in a place where it will be exposed to the vibration larger than 42.2m/s^2.

2.2.2 Space for maintenance

・An adequate space shall be provided around the valve to assure the safety during the maintenace/troubleshooting work (see Figure 2-1).



(Figure 2.1)

2.3 Piping method

⚠ CAUTION	a) Fix the product when tightening or reinstalling the piping. 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 2-4 for reference.

(1) Cleaning the pipes

・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

・Dust and foreign matter within the fluid causes the valve to malfunction and leak. Install a filter 5μm or finer at the primary side of the valve.

・The rusting of the inside of the pipes may lead to a malfunction and/or leakage.

(3) Flowing direction of the fluid

・Carry out the piping to connect the pilot port of the pulse jet valve and the IN port indicated on the valve (PJVB).

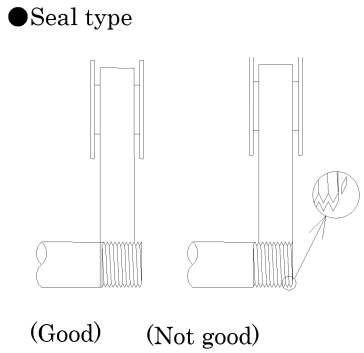
(4) Sealer

・The sealer shall be used with great care to prevent it from entering the pipes or leaking out.

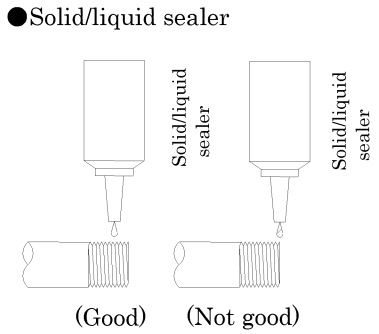
・When taping a threaded portion, one or two threads at the end of the portion shall be exposed (see Figure 2-2).

・When using liquid sealer, take care not to apply too much sealer. Similarly to the case of taping, one or two threads at the end of the threaded portion shall be exposed (see Figure 2-3).

・Do not apply to the female screw of the apparatus.



(Figure 2.2)



(Figure 2.3)

(5) Torques required for tightening pipes

・The torques required for tightening pipes are shown in Table 2-4 for reference.

Table 2-4. Recommended values of the torques for tightening pipes

Nominal size of pipe	Torque for tightening pipe
Rc 1/8	7 - 9 [N・m]
Rc 1/4	12 - 14 [N・m]

(6) Lubricated or unlubricated operation

・This valve requires no lubrication. Never lubricate the valve.

2.4 Wiring method

⚠ CAUTION	a) Carry out the wiring work with the cover removed. Put the removed cover in a safe place where the cover does not fall and an operator does not step it on. b) Incorrect wiring of the power supply lines may cause a short-circuit trouble. Always carry out the wiring properly. c) If the valve is repeatedly energized and de-energized for an extended period of time, the coil surface of the solenoid valve becomes hot, causing burn hazard. Do not touch the valve surface directly during operation.

(1) Intermittence rating

The solenoid valve is energized at the intermittent rating. At this time, the valve is energized for 1 sec. or less, and de-energized for 1sec. or more.

(2) 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.

Rated voltage	AC100V	AC200V	DC12V	DC24V
Permissible limit of leakage current	6mA	3mA	2mA	1mA

CKD's step controller OMC-2 series meets the above specifications.

(3) 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 surge killer.

(4) Wiring

・The electric wires are connected to the terminal block. Two COM terminals are provided on the terminal block. Since they are connected inside the circuit board, connect the COM line to either terminal. Terminals V1 - V12 are applicable to relevant solenoid valves. The leftmost valve is V1 when viewed with the IN port faced toward you. The screw size of the terminal block is M4.

(5) Always attach the cover to the terminal block after wiring.

(6) The voltage variation shall be within ±10% of the rated voltage.

(7) G1 grade threading is made on the electric wire take-out port. Therefore, a pipe made of thin steel cannot be screwed into this port.

3. Pre-operation (post-installation) check

3.1 Appearance check

⚠WARNING	Shut off the fluid flow. Exhaust the fluid remaining in the valve. Turn off the power.

(1) Push the valve with finger to check that the valve has been fixed to the pipe or mounting hole.

(2) Check that the fasteners including hexagonal socket head cap screws and bolts have not been loosened.

3.2 Check for leakage

(1) Compress the fluid to check for leakage at pipe joints.
It is recommended to check for leakage by supplying a pneumatic pressure of 0.3 - 0.5 MPa with soapy water applied to the joints. Air bubbles will be generated at the leaking joints.

3.3 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) Check the dielectric resistance.
Measure the dielectric resistance using a 1,000 VDC megaohmmeter between a metallic part such as screw fixing the valve and the active part of the lead. The measured dielectric resistance shall be 100 Mohms or more.

(2) Check the supply voltage.
The voltage variation shall be within ±10% of the rated voltage.

(3) Wiring method
To ensure the safety of the power supply equipment, an appropriate shut-off device, such as fuse shall be mounted. The electric wire with an area of about 0.5 mm^2 is used as reference.

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) 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. d) 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. e) To use the valve in an explosive atmosphere, select an optimal valve from the explosion proof solenoid valve-series.

⚠CAUTION	a) If there is a possibility that the operator may trip on a power cable, it may lead to an accident. Protect the power cable using a conduit or equivalent. b) Install a silencer at the exhaust port of the main piping to the valve to reduce the noise to be given to the personnel working around the machine.

(1) Do not put any object that weighs 1 kgf or more on the product.

(2) The voltage variation shall be within ±10% of the rated voltage.

(3) Determine a period of energizing time according to the dust collection efficiency of the customer's dust collector. The responsibility may vary depending on the inside diameter and/or length of the tube connecting the pulse jet valve and this valve. It is recommended to use a tube with an inside diameter of 4 or 6 mm and a length of 1 m or less. Additionally, it is also recommended to use tubes with the same length.

(4) If the valve has been out of use for seven days or longer, a commissioning shall be performed before operating the valve.

(5) Periodically remove the drain accumulated in the air filter.

(6) If the filter element of the air filter turns black, it means that it has been contaminated with tar. Periodically clean the filter element.

(7) If any abnormal condition is found, see section "Troubleshooting."

4. 2 Disassembly and assembly procedure

4.2.1 Disassembly procedure

⚠ CAUTION	a) Turn off the power. If the valve is disassembled with the power remained on, this may cause the coil assembly to be burnt. b) Shut-off the fluid flow. c) Exhaust the fluid from the valve (in header tank) and confirm that the pressure is 0 MPa. Disassemble or reassemble the valve with the cover removed. d) Put the removed cover in a safe place where the cover does not fall and an operator does not step it on.

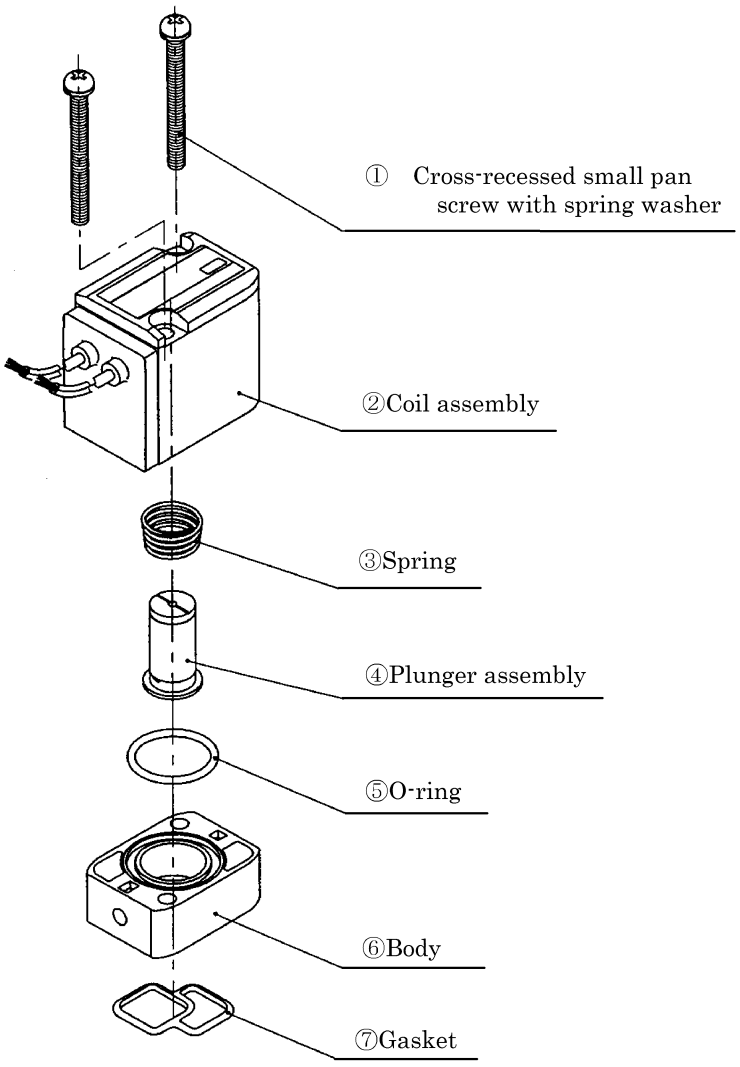
(1) Always turn off the power, and exhaust the fluid and pressure before disassembling the valve.

(2) Disassembly of solenoid valve (GFAB31-X0930,-X0931,-X1763)

Disconnect the lead wires from the terminal block before disassembling the solenoid valve. Loosen the cross-recessed small pan screws with spring washers to remove the coil assembly, outer spring, plunger assembly, O-ring, body, and gasket in that order.

(3) To protect the electrically live parts, do not wash the coil assembly. For AC-voltage solenoid valves, wipe off only foreign particles, since oil is applied to the plunger assembly. Never use organic solvent since it may cause the rubber or resin parts to swell or deteriorate.

(see Figure 4-2, Exploded view.)



(Figure 4.2) Developed view of the pilot solenoid valve

4.2.2 Assembly procedure

(1) The valve components are reassembled in the reverse order of disassembly so that no parts are missing.

(2) Tighten the cross-recessed small pan screws with spring washers evenly with the specified tightening torque shown below.

(Table 4-2. Torques required for tightening)

Size of screw	Torque required for tightening
M4	1.1 – 1.8N･m

(3) Connect the lead wires to their previous positions on the terminal block. At this time, the above tightening torque also applies to the wiring work.

⚠ CAUTION	a) Incorrect wiring of the power supply lines may cause a short-circuit trouble. Always carry out the wiring properly.

(4) To attach the cover, press-fit the cover so that it is in contact with the sub-plate, and then secure it with a catch-clip. If the cover is not press-fit completely (stopped halfway), the protective structure does not show the optimal level.

5. Maintenance

5. 1 Maintenance and inspection

(1) To keep the product in the good condition, inspect it twice a year unless otherwise specified.

(2) For the content of the inspection, see section 3 “Pre-operation check.”

5. 2 Service parts

(1) Solenoid valve (Model No. : GFAB31-X0930, -X0931,-X1763)

Replace the solenoid valve with a new one if an electric failure or other abnormal condition is observed. As a guideline, replace it every 10 million cycles. (If dry air or nitrogen gas is used, replace the valve every 1 million cycles.) The proper model name must be informed when ordering the solenoid valve.

6. Troubleshooting

If the valve does not function as specified, check it according to Table 6-1.

Table 6.1

Symptom	Cause	Action
The valve does not move. Specified flow rate cannot be obtained.	It is not energized.	Check the wiring and fuse and turn on the power supply.
	The voltage is lower than the rating.	Check the power supply and apply the rated voltage.
	The power is not turned on.	Locate the cause of the circuit breaker malfunction and turn on the power. Additionally, check that the controller functions correctly.
	The fluid pressure is too high.	Adjust the pressure.
	Foreign matter enters.	Clean the inside of the valve.
The valve does not return.	It is not de-energized.	Check that the controller functions correctly.
	Foreign matter enters.	Clean the inside of the valve.
	Current leaks.	Replace the valve with a one meeting the leakage current limit range described in clause (1) on page 7.
	The electric wires are connected reversely.	Check the wiring connections and correct it if any connection is faulty.

※If further information is required, consult us or the nearest agency.

7. Specifications for the product

7. 1 Meaning of the model No.

How to order

PJVB - 6 - 3 - 10 - AC100V

Model no.

Ⓐ Port size *1

Ⓑ Orifice *1

Ⓒ Station no.

Ⓓ Voltage *2

Symbol	Descriptions
Ⓐ Port size	
6	Rc1/8
8	Rc1/4
Ⓑ Orifice	
3	ø3
5	ø5
Ⓒ Station no.	
2	2 stations
3	3 stations
4	4 stations
5	5 stations
6	6 stations
7	7 stations
8	8 stations
9	9 stations
10	10 stations
11	11 stations
12	12 stations
Ⓓ Voltage	
AC100V	100 VAC (50/60 Hz), 110 VAC (60 Hz)
AC200V	200 VAC (50/60 Hz), 220 VAC (60 Hz)

<Example of model number>

PJVB-6-3-10-AC100V

Model no.: PJBV

Ⓐ Port size : Rc1/8
Ⓑ Orifice : ø3
Ⓒ Station no.: 10 stations
Ⓓ Voltage : 100 VAC (50/60 Hz), 110 VAC (60 Hz)

*1: When orifice size is ø5, port size R1/8 (Ⓐ 6) is not available.
*2: For voltages other than above, consult with CKD. DC voltage is used only for orifice size ø3, and is custom ordered.
*3: Types with surge suppressor is custom ordered.

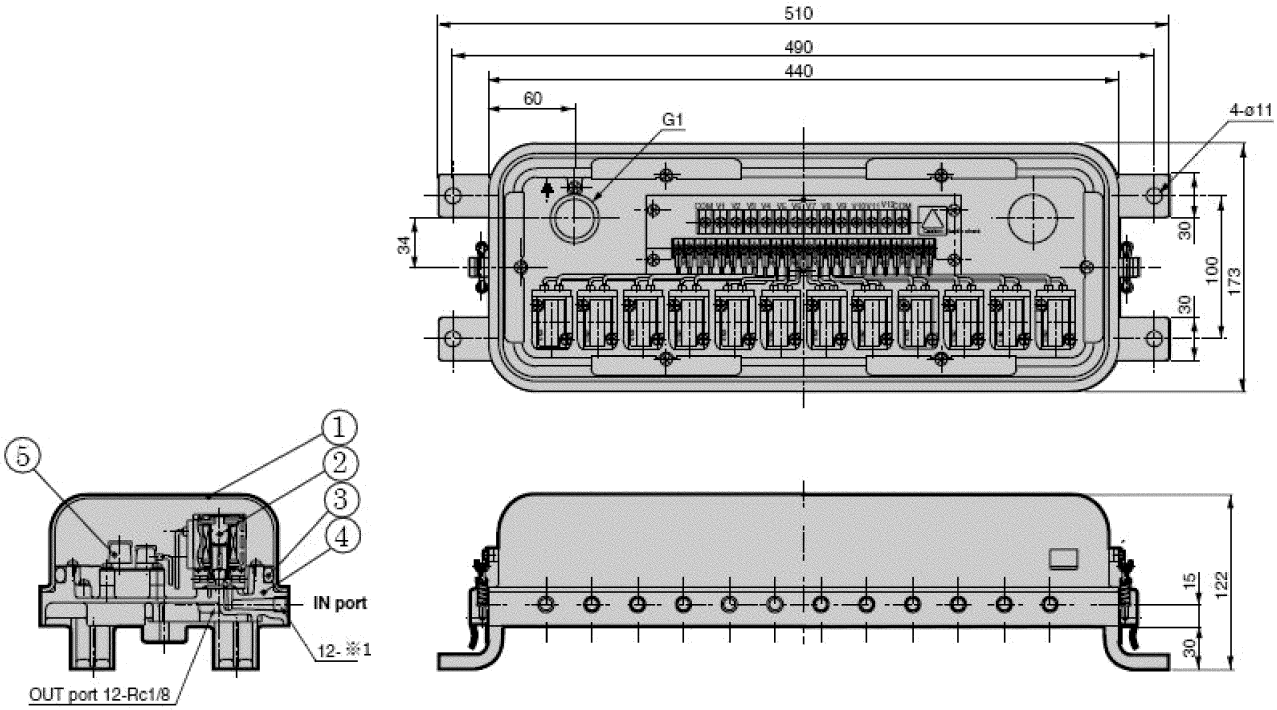
7. 2 Specifications for the product

Specifications

Item		PJVB-6/8-3	PJVB-8-5
Working fluid		Air (no corrosive gas)	
Working pressure range MPa		0 to 0.7	
Withstanding pressure (water) MPa		1.1	
Fluid temperature °C		-10 to 60 (no freezing)	
Ambient temperature °C		-10 to 60	
Atmosphere		Place free of corrosive gas and explosive gas	
Valve structure		Direct acting poppet structure (normally closed)	
Port size		Rc1/8, Rc1/4	Rc1/4
Orifice mm		3	5
Rating		Intermittent rating (ON: 1 sec or less, OFF: 1 sec or more)	Intermittent rating (ON: 1 sec or less, OFF: 10 sec or more)
Box specifications			
Case material		Aluminum	
Hole for conduit		G1	
Mounting attitude		Place sub-plate downward.	
Protective structure		Equivalent to IP64	
Size (reference) mm		140 x 510 x 105 (depth x width x height/solenoid valve 2 to 12 stations)	
Electric specifications			
Rated voltage		100 VAC (50/60 Hz), 110 VAC (60 Hz); 200 VAC (50/60 Hz), 110 VAC (60 Hz)	
Voltage fluctuation range		-10 to +10% of rated voltage	
Apparent power (VA)	Holding	7.5 (50 Hz), 5.5 (60 Hz)	21.3 (50 Hz), 13.4 (60 Hz)
	Starting	20 (50 Hz), 17 (60 Hz)	40.6 (50 Hz), 33.0 (60 Hz)
Power consumption W		4.0 (50 Hz), 3.4 (60 Hz)	9.8 (50 Hz), 6.6 (60 Hz)
Heat proof class		B	

8. Internal construction drawings

8. 1 PJVB Series



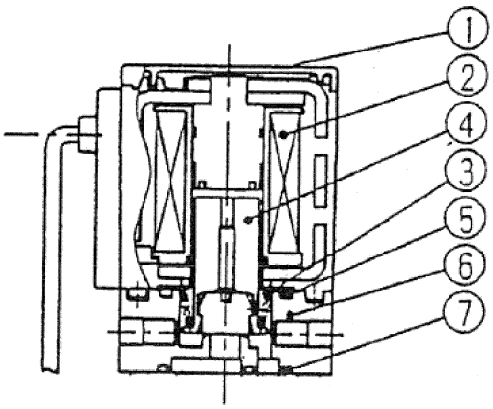
※1 IN port size

Model	Size
PJVB-6	Rc1/8
PJVB-8	Rc1/4

Part list

No.	Part name	Qty
①	Cover	1
②	Solenoid valve	2-12
③	O-ring	1
④	Sub-plate	1
⑤	Terminal block set	1

8. 2 Solenoid Valve (GFAB31-X0930,-X0931,-X1763)



Part list

No.	Part name	Qty
①	Cross-recessed small pan screw with spring washer	1
②	Coil assembly	1
③	Spring	1
④	Plunger assembly	1
⑤	O-ring	1
⑥	Body	1
⑦	Gasket	1