Discontinue

SM-1715-2A/3

CKD

INSTRUCTION MANUAL

HVB 5/6/7/8 1- 12/15 F

- 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.

CKD Corporation

FOR SAFETY USE

The Product is to be used by those who has a basic knowledge about material, fluid, piping electricity regarding Control Valves (solenoid valves, motor valves, air operated valves and so on.)

Never use this Product by those who have no knowledge or are not well trained about Control Valves.

Should be any trouble or accident caused by a wrong selection and/or wrong use of the Product even by a person of basic knowledge about Control Valves, we are not responsible therefore.

Since any customer of the Product have a variety of its application, we are not in a position to get all the information on how and where the Product is used. There may be the cases where that the Product may not meet customers' requirement or may cause any trouble or accident, by fluid, piping or other condition that are not within the specifications of the Product.
Under such a circumstance, select with their responsibility the most suitable application and use of the Product according to the customers' requirements.

The Product incorporates a various safety arrangement, however miss-handling of the product may lead to any trouble or accident on customers side. **To avoid any possible trouble, read this INSTRUCTION MANUAL carefully and understand it fully.**

Pay your attention to the items described in this Text, as well as the items indicated below.

⚠ CAUTIONS

- **When energized, heat is generated at coil portion of solenoid valves and motor valves particularly "Class H" coil where may have a high temperature.**

- **There my have electric shock when wire connecting portion of solenoid valves or motor valves are touched. In case of disassembly or inspection, turn off power supply beforehand. Don't touch live portion by wet hands.**

- **Make piping so as not to have leakage and check for no leakage before use, because in case of control valves for high temperature fluid like steam, leakage may cause heat injury.**

Thank you very much for purchasing CKD's solenoid valve model HVB series for use in a high vacuum atomsphere.

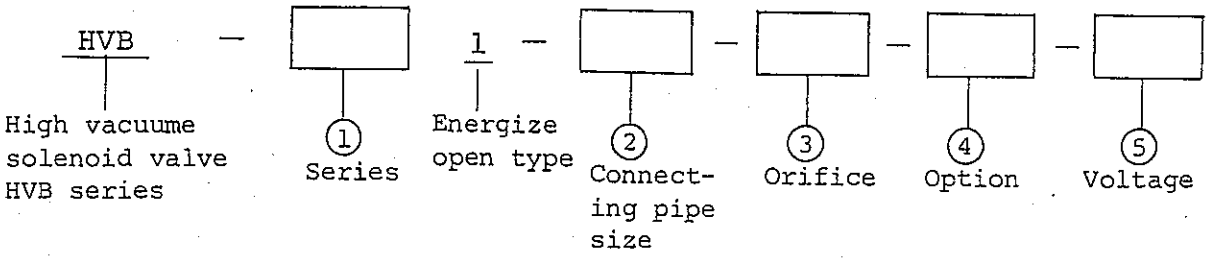
This HVB series developed for the range from medium vacuum to high vacuum.

We are sure that CKD's strict quality control system will draw your complete satisfaction.

In order to use the CKD products more effectively, please read through this instruction manual thoroughly.

CONTENTS

1. HOW TO READ THE MODEL NO.



①	Series
5	
6	
7	
8	

②	Connecting pipe size
12F	Flange ϕ48
15F	Flange ϕ52

③	Orifice
3	Small
5	Large

④	Option
3H	Square shape terminal box with a lamp (G 1/2)
3K	Square shape terminal box with no lamp (G 1/2)
F	Companion flange (including O-ring and mounting bolt)
3HF	Square shape terminal box with a lamp (G 1/2) + Companion flange (including O-ring and mounting bolt)
3KF	Square shape terminal box with no lamp (G 1/2) + Companion flange (including O-ring and mounting bolt)

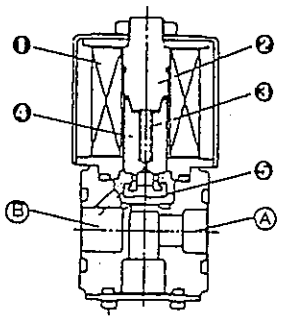
A square shape terminal box can not be assembled in models HVB61 and HVB81.

⑤	Voltage
AC 100V (50Hz/60Hz)	
AC 200V (50Hz/60Hz)	
DC 24V	

2. FUNCTIONAL EXPLANATION, INTERNAL STRUCTURE, AND PARTS LIST

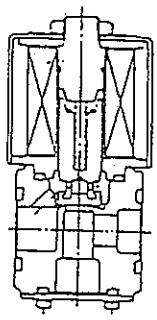
· Functional explanation

• Opening movement



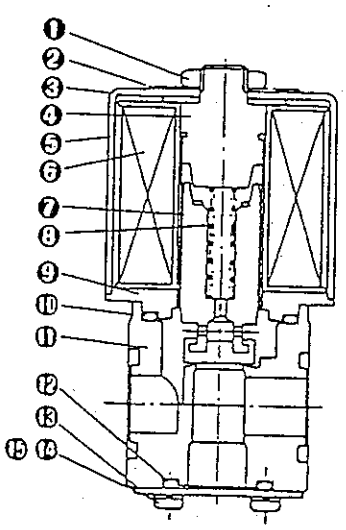
When the coil ① is energized, the fixed iron core ② absorbs the plunger ④ to open the valve seat ⑤. Then the chambers Ⓐ and Ⓑ open.

• Closing movement

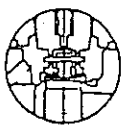


When the coil ① is de-energized, the plunger ④ lowers down due to the force of spring ③ to close the valve seat ⑤. Then the chamber Ⓐ and Ⓑ closes.

· Internal structure and parts list



• Model HVB*1-**F-3 differs in internal structure.



No.	Parts name	Material	Remark
1	Nut	SS400	
2	Name plate	A1200P	
3	Bonnet piece	SPCC	
4	Core A	SUS405	
5	Bonnet	SPCC	
6	Coil		B type coil H type coil
7	Plunger assembly	SUS405,FKM	
8	Spring	SUS304	
9	Core B	SUS403	
10	O-ring	FKM	
11	Body	SUS304	
12	O-ring	FKM	JIS B2401 V-24
13	Blind	SUS304	
14	Cross recessed head machine screw	SWRM10	For M4 (HVB51,61) For M5 (HVB71,81)
15	Spring washer	SWRH62A	For M4 (HVB51,61) For M5 (HVB71,81)

3. CAUTIONS

3-1 Cautions for use

(1) Do not mount the valve where there is much corrosive gas, explosive gas, etc.

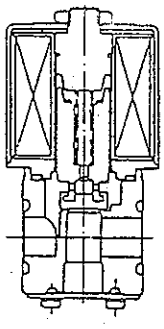
(2) Be sure to operate the valve within the specified pressure range, otherwise it may cause malfunction of the machine.

(3) Be sure to keep the ambient temperature and fluid temperature within the specified temperature range.

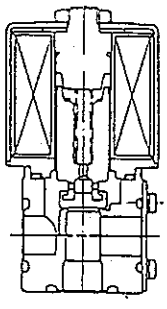
(4) The ambient temperature shall be 70% of the rating.

(5) The exhaust port can be used in two ways depending upon place of blind mounted. (However, at the time of shipping, the valve is designed to have a straight piping as shown in the right side figure below.

• Straight piping



• L shape piping

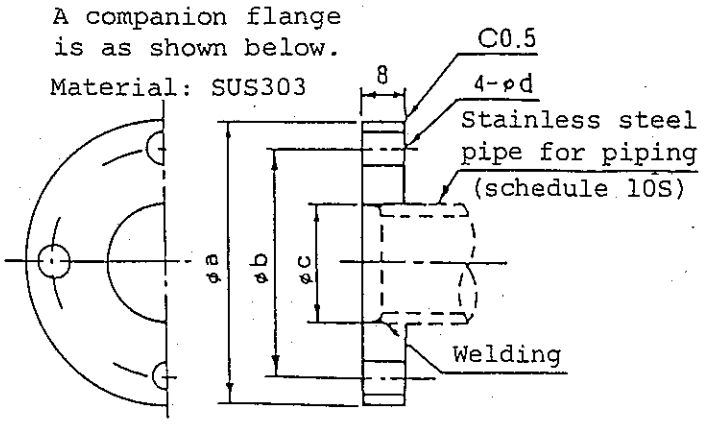


(6) A flange used here is different from the one stipulated in JIS in size.

o If 12F is shown on the model number, the connecting pipe size is 48 mm in outer diameter. (The thickness of flange is 6 mm with a screw passes through.)

o If 15F is shown on the model number, the connecting pipe size is 52 mm in outer diameter. (The thickness of flange is 6 mm with a screw passes through.)

A companion flange is as shown below.
Material: SUS303

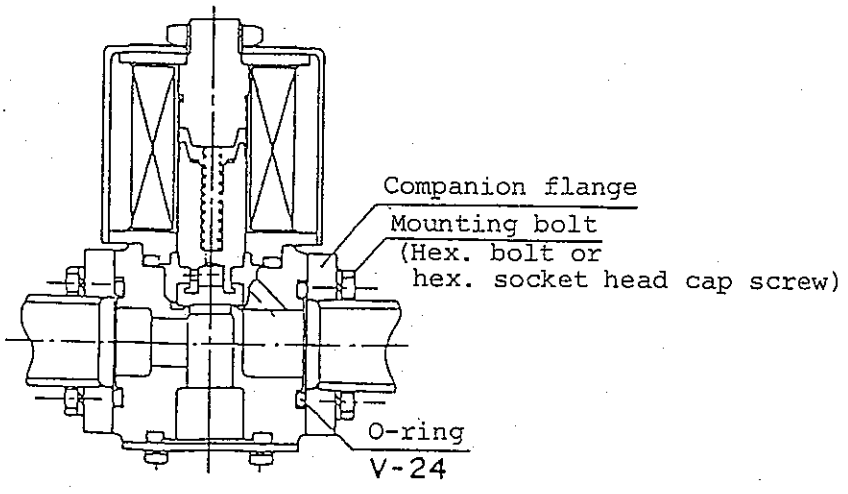


	a	b	c	d	Mounting bolt	O-ring used
HVB＊＊-12F	48	40 ±0.2	$17.3^{+0.5}_{0}$	4.8	M4-14	JIS B2401 V-24
HVB＊＊-15F	52	424 ±0.2	$21.7^{+0.5}_{0}$	5.8	M5-14	JIS B2401 V-24

(7) If dusts, foreign materials, etc. enter in the fluid, attach a filter of 60 μm or finer one on the air side of the solenoid valve.

3-2 Cautions for piping

(1) Use V24 (JIS B2401) O-ring for which fitted in between flange. Use care that no foreign material attaches to O-ring.



(2) Mount the valve vertical so that the coil faces upward.

(3) Pay attention to the connecting direction. Check for pressure rating and select the direction.

(4) Make flushing to remove foreign materials, swarf, etc. in the pipe before piping. If they are not completely removed, it may cause malfunction of solenoid valve operation.

(5) After piping, check each connecting section for leakage. We recommend you to confirm leakage using a helium leak detector.

3-3 Cautions for wiring

(1) Use an electric wire whose nominal sectional area is 0.5 mm^2 or more.

(2) Adopt a switching circuit which does not cause chattering at the contact point.

(3) The voltage shall be within ±10% of the rating.

(4) In the case of use of no contact point relay circuit, be careful about leakage current. Select a switch whose capacity is 10% less than the rated current.

4. MAINTENANCE AND INSPECTION

4-1 Periodic inspection

(1) In order to use the valve with best possible condition, be sure to carry out periodic inspection once or twice a year.

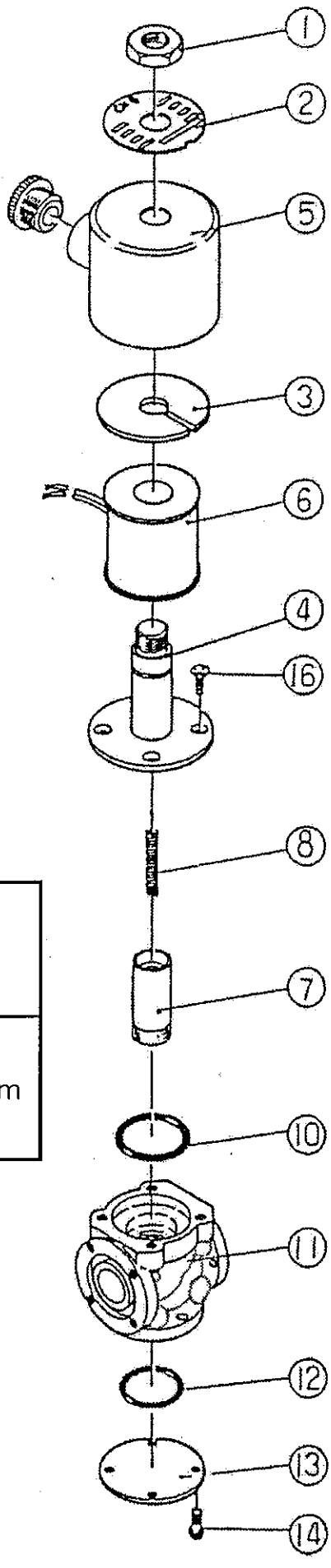
(2) Contents of inspection

(a) Check to see if any dust, foreign material, etc. is not accumulated in the plunger, body, valve seat, etc. If souch is found, disassemble and clean the unit.

(b) Check to see if the plunger, core assembly in the actuator is not damaged or abnormally worn out. If such is found, replace it.

(c) Check to see if valve seat in the actuator is not damaged or abnormally worn out. If such is found, replace it.

4-2 Disassembly, reassembly and inspecton



・Disassembly

(1) Be sure to turn power off and then purqe fulid pressure before disassembly.
(2) For removal of coil⑥, plate②, bonnet⑤ and bonnet pice③ can be taken out when nut① is loosened
(3) For removal of plunger assembly, loosen four cross-recessed coutershunk flat head screw⑯ to separate core assembly④, spring⑧, and plunger assembly⑦.
(4) For removal of bottom plate⑬, unscrew one cross recessed head machin screw⑭. Then bottom plate⑬ with one O-ring in it can be removed.

・Reassembly

(1) Reassemble the valve in the reverse order of disassembly.
(2) Use care, while reassembling, that no dust, foreign material stick to plunger assembly⑦(including vave seat)、spring⑧, core assembly④, O-ring⑩⑫, body⑪, bottom plate⑬.
(3) Each screw has been tightened to a torque in the range of the list shown below.

model	cross-recessed coutershunk flat head screw⑯ cross-recessed head machin screw⑭	nut①
HVB51—□ HVB61—□	1.5 ～ 2.0 N·m	8～10 N·m
HVB71—□ HVB81—□	2.5 ～ 3.0 N·m	

・Inspecton

(1) Ceck for external and internal leakage using a helium leak detector.
(2) Then apply electrical signal to see if the valve switches property.

4-3 Troubleshooting

Symptoms		Cause	Countermeasure
Degree of vacuum does does not increase.	Internal leakage (The leakage from valve seat, etc.)	· Foreign material is attached to the valve seat section.	Disassemble and clean.
		· Foreign material is attached to the valve seat section.	Disassemble and clean.
		· Valve seat is damaged.	Replace.
		· Mounting direction of the valve is incorrect.	Change the direction.
	External leakage (except the leakage from valve seat, etc.)	· Foreign material is attached to the O-ring in the seal section.	Disassemble and clean.
		· The core assembly is damaged.	Replace.
Valve does not activate properly.	Valve does not open.	· Power is not ON.	Check power source.
		· Foreign material is bit in either to plunger or core assembly.	Disassemble and clean.
		· Plunger or core assembly is abnormally worn out.	Replace.
		· The pressure difference of the valve is beyond the allowable pressure difference range.	Adjust the pressure to the allowable range or change the valve which meets the rating.
		· Coil failure	Replace.
	Valve does not close.	· Power is not OFF.	Check power source.
		· Foreign material is bit in either to plunger or core assembly.	Disassemble and clean.
	Instable valve operation	· Foreign material is bit in either to plunger or core assembly.	Disassemble and clean.
		· Plunger or core assembly is abnormally worn out.	Replace.
	Burned coil	· Abnormal voltage	Check voltage. Match coil voltage and power voltage.

◎ Any other troubles not included in the above table shall be contacted to our engineering department or our agent.