

CKD

INSTRUCTION MANUAL

HVB 112-6N-5
41-8N-5

- 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 may 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 atmosphere.

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

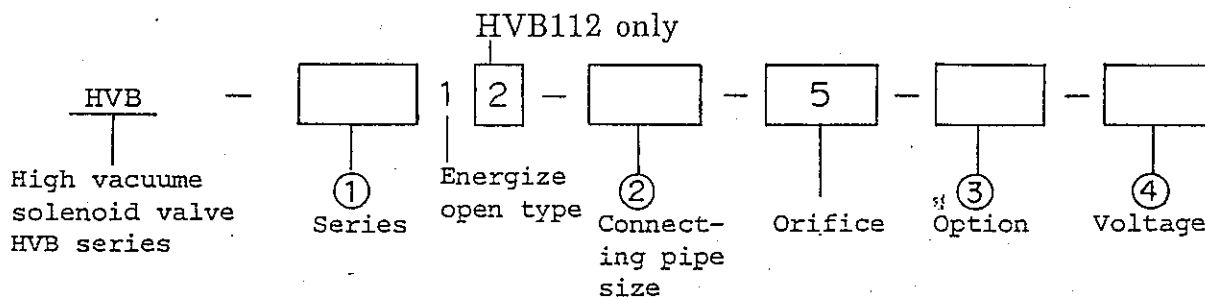
We are sure that CKD's strict quality control system will draw your complete satisfaction.

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

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1. HOW TO READ THE MODEL NO.



| ① Series | |
|----------|--|
| 1 | |
| | |
| | |
| 4 | |

| ② Connecting pipe size | |
|------------------------|---------|
| 6 N | NPT 1/8 |
| 8 N | NPT 1/4 |

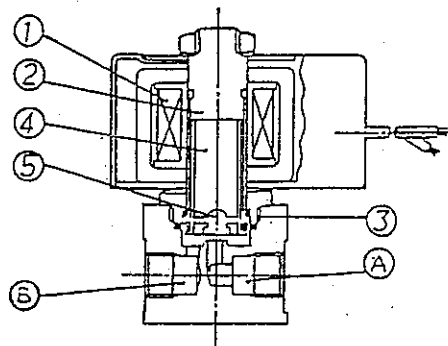
| ③ Option (HVB41 only) | |
|-----------------------|--|
| 3H | Square shape terminal box with a lamp (G 1/2) |
| 3K | Square shape terminal box with no lamp (G 1/2) |
| B | Bracket |
| 3HB | Square shape terminal box with a lamp (G 1/2) + Bracket |
| 3KB | Square shape terminal box with no lamp (G 1/2) + Bracket |

| ④ Voltage | |
|---------------------|--|
| AC 100V (50Hz/60Hz) | |
| AC 200V (50Hz/60Hz) | |
| DC 24V | |

2. FUNCTIONAL EXPLANATION, INTERNAL STRUCTURE, AND PARTS LIST

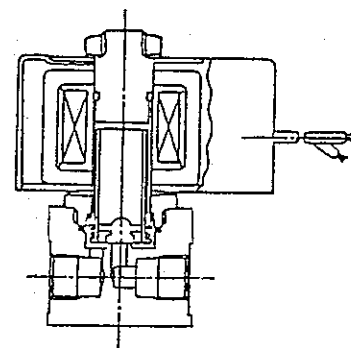
• Functional explanation

• 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 (A) and (B) open.

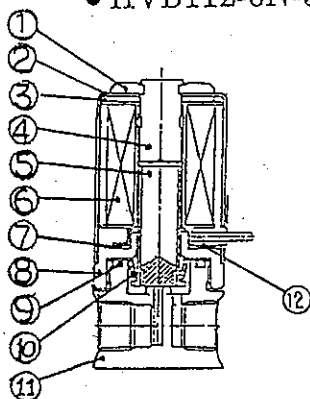
• Closing movement



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 (A) and (B) closes.

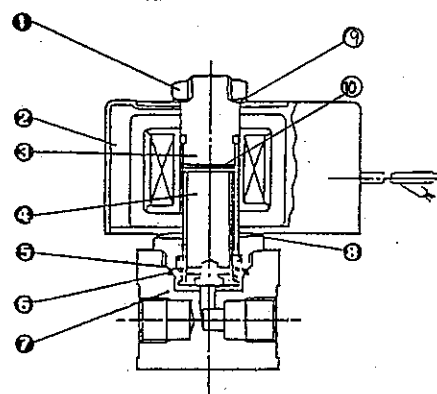
• Internal structure and parts list

• HVB112-6N-5



| No. | Parts name | Material |
|-----|------------------|----------------|
| 1 | Clip | PBT |
| 2 | Bonnet | SPCC |
| 3 | Bonnet piece | SPCC |
| 4 | Core assembly | SUS316, SUS405 |
| 5 | Plunger assembly | SUS405, FKM |
| 6 | Coil assembly | |
| 7 | Wave washer | S65CM |
| 8 | Core B | SUM22 |
| 9 | O-ring | FKM |
| 10 | Spring | SUS304WPB |
| 11 | Body | SUS303 |
| 12 | Insulation film | PET |

• HVB41-8N-5



| No. | Parts name | Material |
|-----|------------------|-------------------|
| 1 | Nut | C3604 |
| 2 | Coil | |
| 3 | Core assembly | SUS405, 403, 316L |
| 4 | Plunger assembly | SUS405, FKM, PET |
| 5 | Spring | SUS304 |
| 6 | O-ring | FKM |
| 7 | Body | SUS303 |
| 8 | Wave washer | SUS301 |
| 9 | Spacer A | SUS304 |
| 10 | Cushion plate | PET |

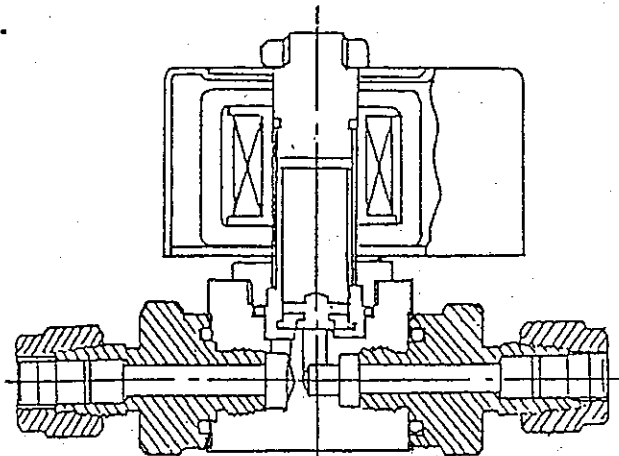
3. CAUTIONS

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.

3-2 Cautions for piping

- (1) A swage lock type tube joint sold on the market can be used. (HVB41-8N type --- SS400-1-4-OR) For HVB112 type, sealing at the connection with joint shall be made with adhesive.



- (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 having nominal sectional area of 0.5 mm^2 or more (0.18 mm^2 for HVB11 type).
- (2) Adopt a switching circuit that does not cause chattering at the contact point.
- (3) The voltage shall be within $\pm 10\%$ of the rating.
- (4) In the case of use of contactless relay circuit, be careful about leakage current. Select a switch whose capacity is 5% lower 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 such 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 inspection (For HVB112 type)

o Disassembly

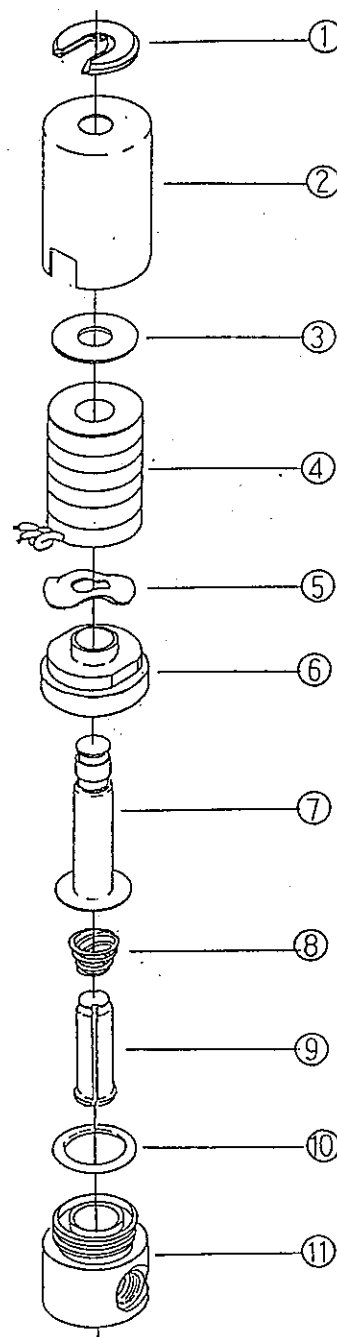
- (1) Be sure to turn off the power and then purge fluid pressure before disassembly.
- (2) To remove the coil assembly ④, remove the clip ①. Then the bonnet ②, ring ③, coil assembly ④ and wave washer ⑤ can be removed.
- (3) To remove the plunger assembly ⑨, loosen the core B ⑥ to remove the core assembly ⑦, spring ⑧ and plunger assembly ⑨.

o Reassembly

- (1) Take the reverse order of disassembly for reassembly.
- (2) Use care, while reassembling, that no dust, foreign material stick to the plunger assembly ⑨, spring ⑧, core assembly ⑦, Oring ⑩ and body ⑪.

o Inspection

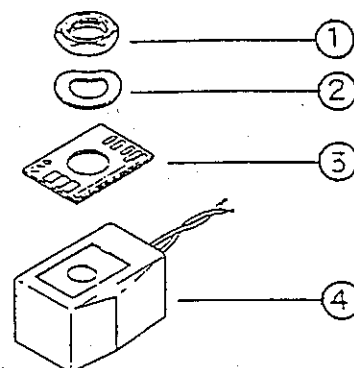
- (1) Check for external and internal leakage using a leak detector.
- (2) Then apply electrical signal to see if the valve switches properly.



(For HVB41 type)

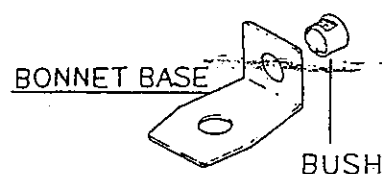
o Disassembly

- (1) Be sure to turn off the power and then purge fluid pressure before disassembly.
- (2) To remove the coil assembly (4), loosen the nut (1). Then the spacer A (2) and name plate (3) can be removed. The coil assembly (4) can be removed.
- (3) To remove the plunger (5), remove the wave washer (11) to remove the spring (8) and plunger (5).



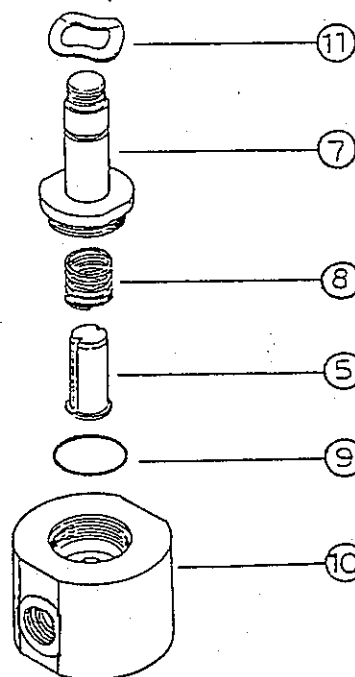
o Reassembly

- (1) Take the reverse order of disassembly for reassembly.
- (2) Use care, while reassembling, that no dust, foreign material stick to the plunger (5), spring (8), core assembly (7), O-ring (9) and body (10).



o Inspection

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



4-3 Troubleshooting

| | Symptoms | Cause | Countermeasure |
|-------------------------------------|--|---|---|
| Degree of vacuum does not increase. | Internal leakage (The leakage from valve seat, etc.) | <ul style="list-style-type: none"> Foreign material is attached to the valve seat section. Foreign material is attached to the valve seat section. Valve seat is damaged. Mounting direction of the valve is incorrect. | Disassemble and clean. Disassemble and clean. Replace. Change the direction. |
| | External leakage (except the leakage from valve seat, etc.) | <ul style="list-style-type: none"> Foreign material is attached to the O-ring in the seal section. The core assembly is damaged. | Disassemble and clean. Replace. |
| Valve does not activate properly. | Valve does not open. | <ul style="list-style-type: none"> Power is not ON. Foreign material is bit in either to plunger or core assembly. Plunger or core assembly is abnormally worn out. The pressure difference of the valve is beyond the allowable pressure difference range. Coil failure | Check power source. Disassemble and clean. Replace. Adjust the pressure to the allowable range or change the valve which meets the rating. Replace. |
| | Valve does not close. | <ul style="list-style-type: none"> Power is not OFF. Foreign material is bit in either to plunger or core assembly. | Check power source. Disassemble and clean. |
| | Instable valve operation | <ul style="list-style-type: none"> Foreign material is bit in either to plunger or core assembly. Plunger or core assembly is abnormally worn out. | Disassemble and clean. Replace. |
| | Burned coil | <ul style="list-style-type: none"> 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.