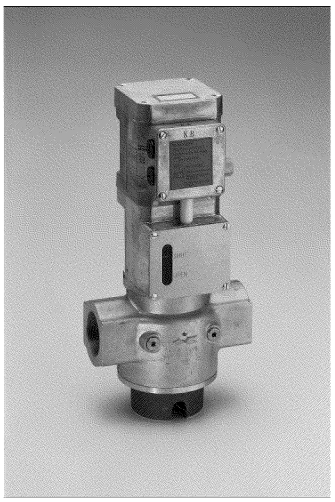
CKD

SM-50518-A

# INSTRUCTION MANUAL

# GAS SHUT OFF VALVE

# HK1



- 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.

2nd edition

CKD Corporation

FOR SAFETY USE

The product is to be used by those who has a basic knowledge about material, fluid, piping and 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 customers 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 and 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.

Preface

Thank you very much for adopting CKD's gas shut off valve (HK1 type).
The product has been manufactured under CKD's strict quality control system.
Since the product is subject to a few operating conditions including temperature, pressure and so on, any user is requested to go through this manual before installation and recognize the correct installation and usage.
After reading, retain this manual for further consultation whenever necessary.

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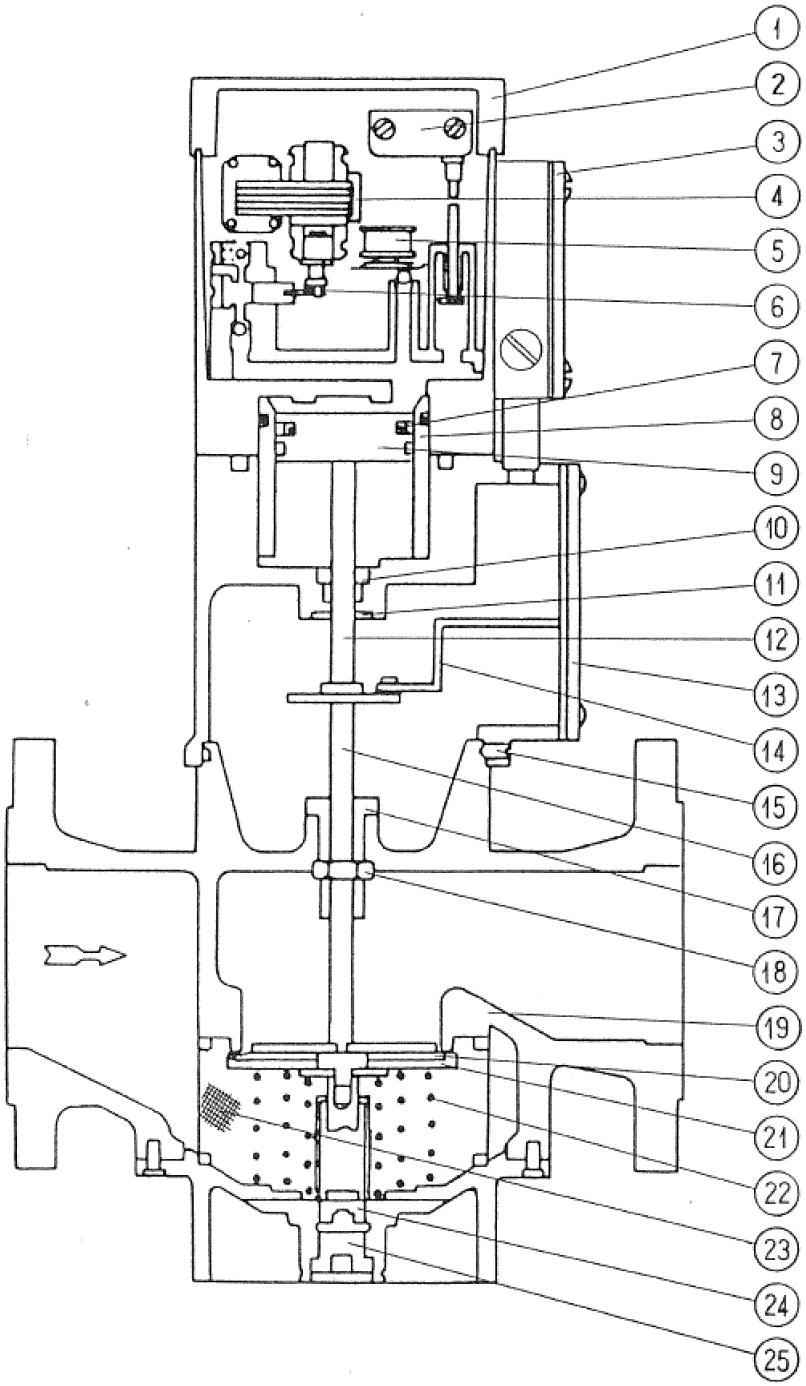
# 1. Structure of the valve



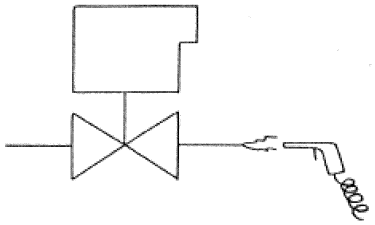

| No. | Parts |
|---|---|
| 1 | Cap |
| 2 | Pressure switch |
| 3 | Cover of the terminal box |
| 4 | Motor |
| 5 | Relief valve |
| 6 | Hydraulic pump |
| 7 | O-ring |
| 8 | Cylinder |
| 9 | Piston |
| 10 | O-ring |
| 11 | Scraper |
| 12 | Piston rod |
| 13 | Cover of the middle flange |
| 14 | Indicator |
| 15 | Set screw |
| 16 | Valve rod |
| 17 | Guide |
| 18 | Hexagon nut |
| 19 | Body |
| 20 | Valve sheet |
| 21 | Valve disk |
| 22 | Spring |
| 23 | Strainer |
| 24 | Flow adjustment screw |
| 25 | Blank plug |

Fig. 1 Structure of the valve

## 2. Instructions about installation

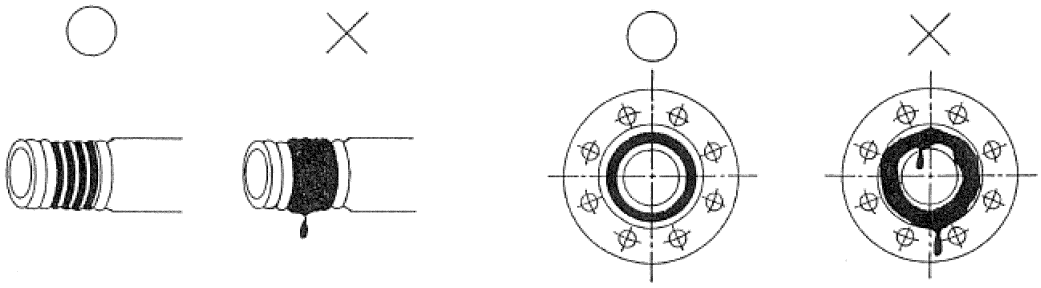
### 2-1. Air flushing

Before fitting the valve to the pipe work, flush inside of the pipe by compressed air and remove the metal dusts.



### 2-2. Sealing

Use Gas Company authorized sealant. In case of screw connection, paste the sealant from 2nd pitch, and make sure that the sealant never goes in to the pipe. In case of flange connection, paste the sealant to the seal surface of the flange, and make sure that the sealant never goes in to the pipe and the valve body. Pay scrupulous attention to a leakage.

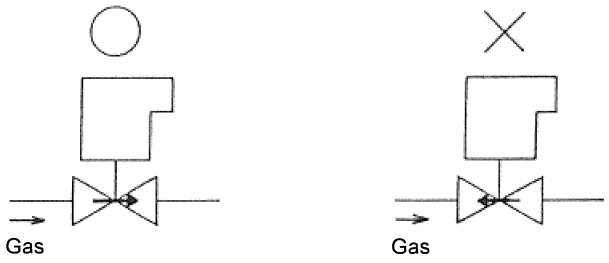


### 2-3. Length of pipe thread

Pay attention to keep the length of the useful thread. If it's too long or too short, it may cause leakage. You may file first half pitch of the pipe thread.

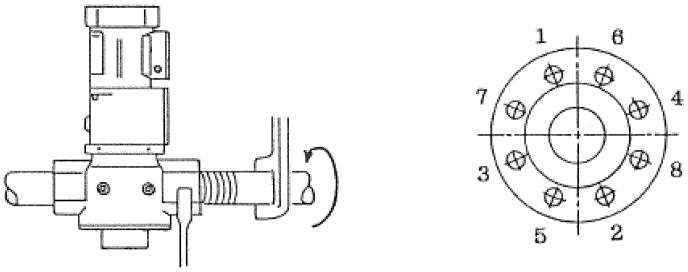
2-4. Flow direction

The direction of the gas flow must correspond to the arrow on the valve body.




2-5. Installation to pipe work

Do not use the actuator as a lever. In case of screw connection, use a suitable spanner at the width across flats of the body. In case of flange connection, use a suitable gasket and those bolts must be tightened with same torque with like the orders specified in the following figure.

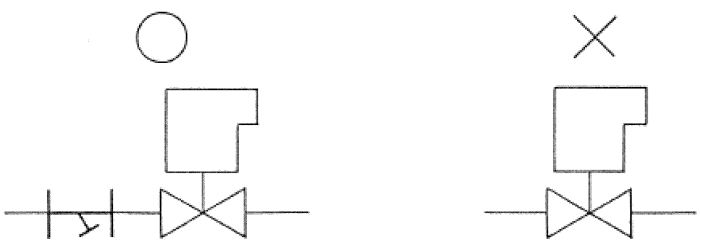



2-6. Mounting posture

Mount the valve vertically with the actuator upright or mount the valve horizontally with the actuator in level without any slant. When mounting the valve horizontally, the terminal box must always be uppermost.

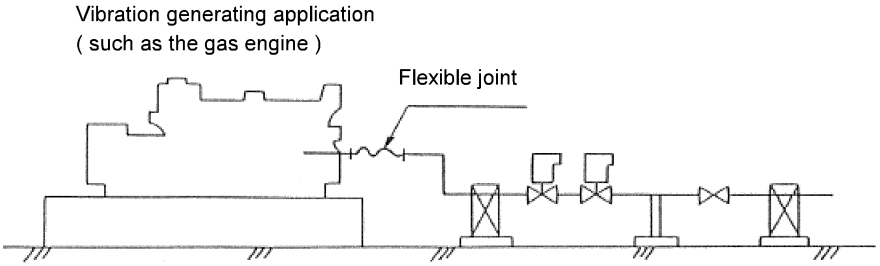

2-7. Installation of filter

Install a filter or strainer upstream of the valve, and filtrate dusts.



2-8. Anti vibration measures

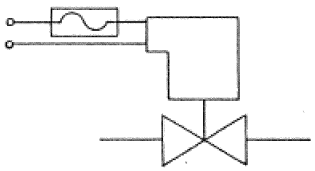
When using the valve to vibration generating applications, such as the gas engines, it is necessary not to conduct such vibration to the valve by using flexible joint.




2-9. Insertion of fuse

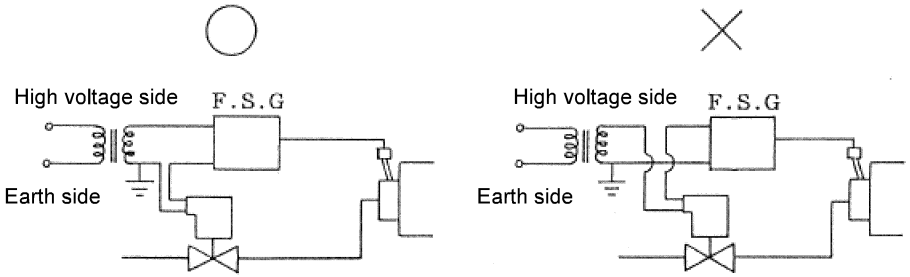
Use fuse capacity of 3A when applying to the valve.

Use those wires thicker than 0.75mm$^2$ of nominal cross sectional area of the conductor, and finish the tip of the wire with a solder.



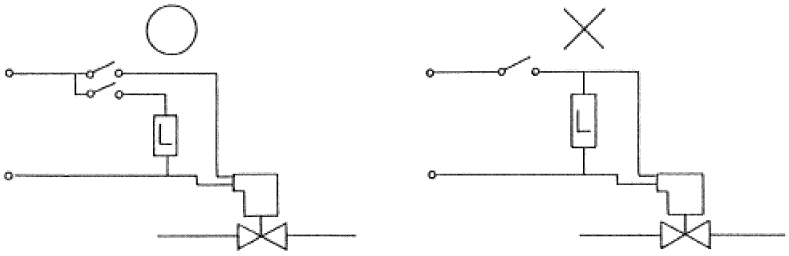
2-10. Connecting

Connect the valve to high voltage side and earth side according to the following circuit diagram.




2-11. Surge voltage prevention

When connecting the valve parallel to inductive load (for example, a motor, a lot of relays), it is necessary to install the valve according to the following circuit diagram to prevent the surge voltage to affect the valve.



2-12. Connecting main voltage line

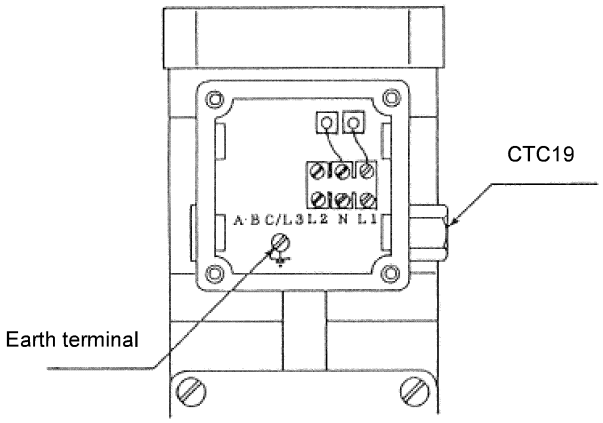
After connecting as follows, apply the main voltage to the valve, and confirm the movement of the valve. Shut down the main voltage and check the valve closing within 1 second.

For preventing electric shocks from unexpected leakage of electricity, earth the valve via earth terminal.

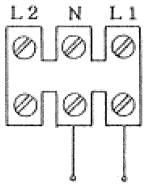
< HK1, HK1E type >

Remove the cover of the terminal box, drag the wires through conduit CTC19, and connect them to the main voltage terminal N and L1.

After connecting, restore the cover of the terminal box.

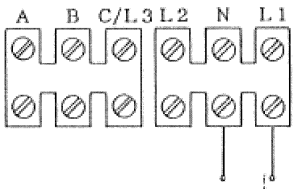



HK1 type




Main voltage

HK1E type




Main voltage

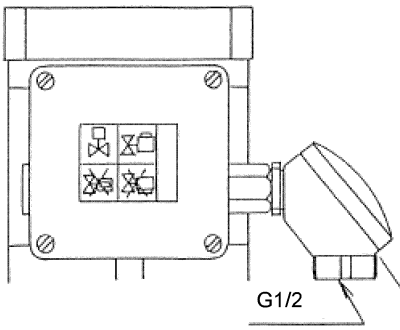
< HK1-B, HK1-ZZ, HK1E-, HK1E-ZZ type >

Remove the cover of the terminal box, drag the wires through conduit G1/2, and connect them to the main voltage terminal A and C.

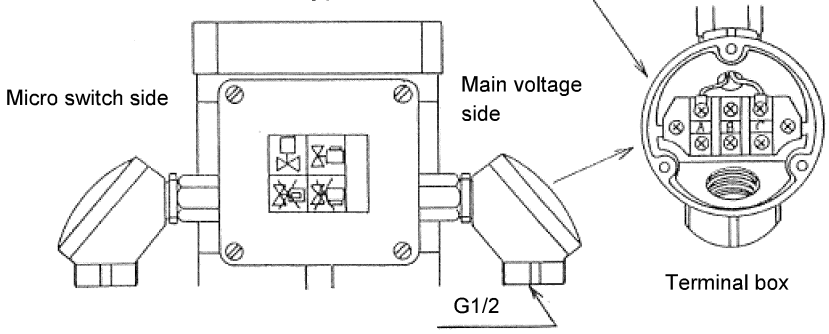
After connecting, restore the cover of the terminal box.

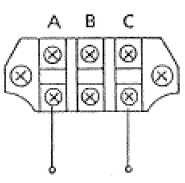
Note) When using HK1-ZZ and HK1E-ZZ at outdoors, it is necessary to protect the valve from the water not to drain into the actuator from the conduit G1/2 by using a necessary water proof conduit or in other measures.

HK1-B, HK1-ZZ type




HK1E, HK1E-ZZ type




Main voltage

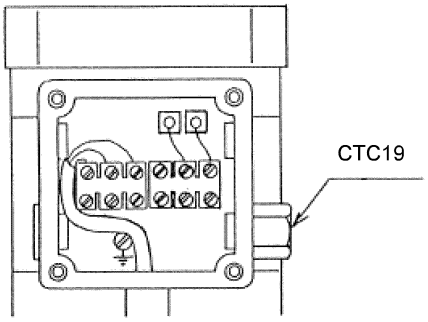
2-13. Connecting for micro switch (HK1E, HK1E-B, HK1E-ZZ type)

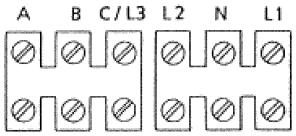
The valves with micro switch inside can detect the open and close position of the valve, and can forward that status by electric signal. The electric signal and the connecting are different by the following types.

< HK1E type >

Remove the cover of the terminal box, drag the wires through conduit CTC19, and connect them to the terminals.

After connecting, restore the cover of the terminal box.




HK1E type (for the indication "opened")
When valve is opened, terminal A and B conducts.
When valve is not opened, terminal A and C/L3 conducts.

HK1E-S type (for the indication "closed")
When valve is closed, terminal A and B conducts.
When valve is not closed, terminal A and C/L3 conducts.

HK1E-ES type (for the indication "opened"/ "closed")
When valve is opened, terminal A and B conducts.
When valve is closed, terminal B and C/L3 conducts.

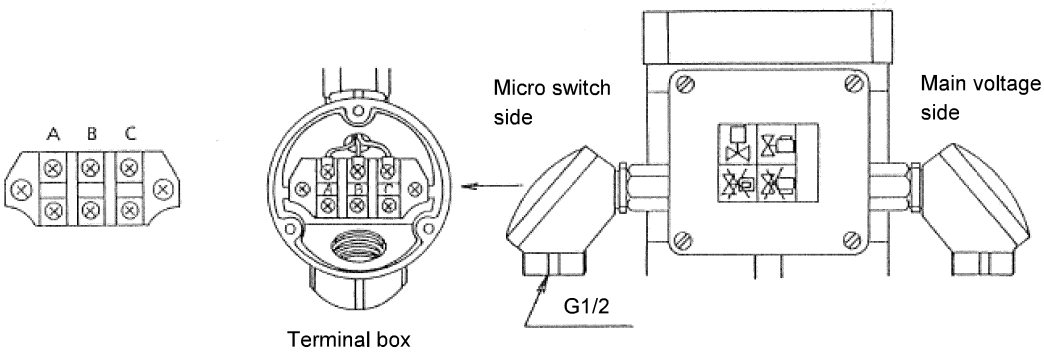
< HK1E, HK1E-ZZ type >

Remove the cover of the terminal box, drag the wires through conduit G1/2, and connect them to the terminals.

After connecting, restore the cover of the terminal box.

Note)

When using HK1E-ZZ at outdoors, it is necessary to protect the valve from the water not to drain into the actuator from the conduit G1/2 by using a necessary water proof conduit or in other measures.



HK1E type (for the indication "opened")
When valve is opened, terminal A and B conducts.
When valve is not opened, terminal A and C conducts.

HK1E-S type (for the indication "closed")
When valve is closed, terminal A and B conducts.
When valve is not closed, terminal A and C conducts.

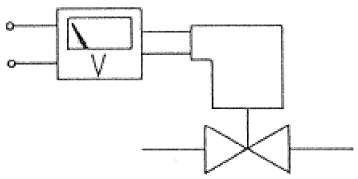
HK1E-ES type (for the indication "opened"/ "closed")
When valve is opened, terminal A and B conducts.
When valve is closed, terminal B and C conducts.

# 3. Instructions about commissioning

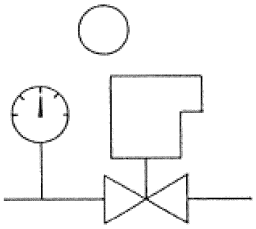
## 3-1. Confirmation of specifications

Confirm whether the operating conditions of voltage and pressure conform to the specifications indicated on the name plate.

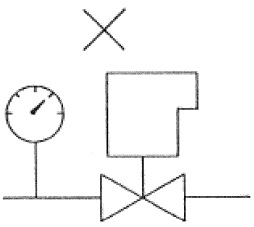
<Main voltage>
Main voltage must be within applicable voltage range (Rated voltage –10 to +10%).




<Operating pressure>
Inlet pressure must be within operating pressure indicated on the name plate.

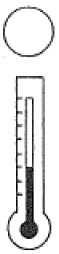


Under max. operating pressure



Over max. operating pressure

<Ambient temperature>
Ambient temperature must be within allowed range indicated on the name plate.



Within operating temperature range

Beyond operating temperature range

3-2. Leakage check

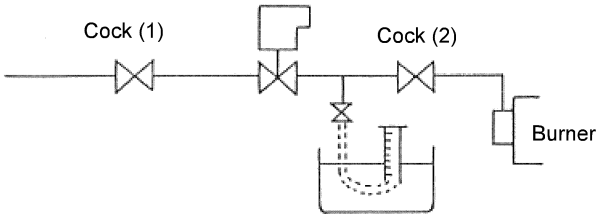
<External leakage>

Pressurize the fluid and detect the leakage by gas detector or soap solvent, and confirm that there is no external leakage from the connection part and from the valve itself.

<Internal leakage>

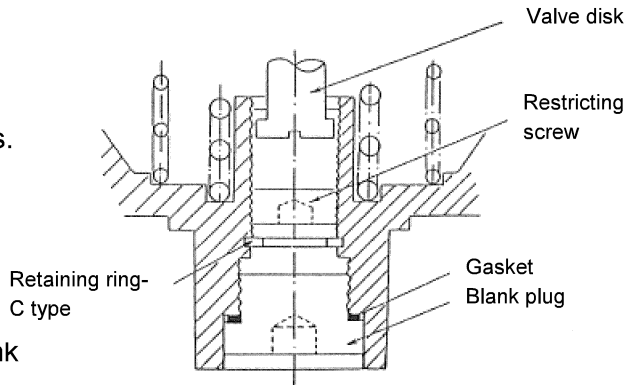
Open the cock (1) and close the cock (2), then connect a hose to downstream of the valve to lead to a water bath to measure the bubble, thus measuring the internal leakage.

For precise measurement, use graduated cylinder to collect the leakage gas.



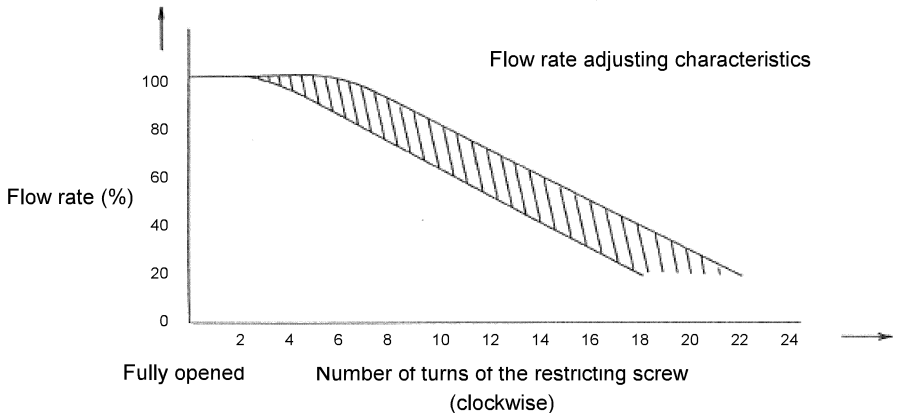

3-3. Flow rate adjusting

1) Remove the blank plug and gasket.
2) Turn the restricting screw with a hexagon socket screw key（Size 10）to adjust the flow rate.
   By turning it clockwise, the flow rate reduces.
   By turning it counterclockwise, the flow rate increases.
   The flow rate adjusting range is 0 to 100% of the maximum flow rate.
3) After adjusting the flow rate, restore the blank plug and gasket. Then confirm that there is no external leakage from this part.




Note) When adjust the flow rate of the valve with micro switch inside (HK1E, HK1E-B, HK1E-ZZ type), the electric signal of the valve position may not be detected.

Relation between the number of turns of the restricting screw and flow rate is shown in the following figure.



# 4. Periodical inspection

Make a periodical inspection according to the periodical inspection procedures for the safety shut off valve that are described in the following safety standards.

Issued from The Japan Gas Association:
- “Guide line for the safe operation of gas boiler combustion equipment”
- “Guide line for the safe operation of industrial gas combustion equipment”
- “Guide line for the safe operation of gas engine for power generation”

Issued from The Japan Refrigeration and Air Conditioning Industry Association:
- "Safety Standard for Gas Fired Absorption Chiller-Heaters (JRA-4004)”
- "Safety Standard for Gas Fired Small-Size Absorption Chiller-Heaters (JRA-4016)”
- "Guidance for The Periodic Maintenance for The Gas Fired Absorption Chiller-Heaters Equipment”

# 5. Trouble shooting

| Trouble | Cause | Check | Remedy |
|---|---|---|---|
| 1. The valve does not open. | a. Malfunction of the electric control circuit | Measure the voltage of the terminals in the terminal box. Applicable voltage range: AC100V/AC200V, ±10% | If measured voltage is not within the applicable voltage range, inspect and repair the circuit. |
| | b. Excess gas pressure applied. | Check if the inlet pressure is over the max. operating pressure. | Inspect and repair the governor. |
| | c. Hydraulic motor does not operate by malfunction of pressure switch. | There is no operating sound of hydraulic pump in the actuator. | Replace the actuator. |
| | d. Internal leakage of hydraulic oil by malfunction of the relief valve | It sounds that hydraulic pump is operating, but piston rod does not operate. | Replace the actuator. |
| | e. External leakage of hydraulic oil | Check the leakage from scraper. Check the leakage from gasket at the cap. | Replace the actuator. |
| 2. The valve does not close. | a. Malfunction of the electric control circuit | Measure the voltage of the terminals in the terminal box. | If the voltage is applied, inspect and repair the circuit. |
| 3. External leakage | a. Improper seal at the pipe connection | Check the leakage from the pipe connection. | Repair the seal of the pipe connection. |
| | b. O-ring at valve rod is broken. | Call the local CKD agent. (Never disassemble.) | Have it repaired by service man. |
| 4. Internal leakage | a. Odd material sticks to valve disk or valve seat, and breakage. | Call the local CKD agent. (Never disassemble.) | Replace the valve or have it repaired by service man. |
| 5. Low flow rate | a. Miss adjusting of flow rate | Check the restricting screw. | Adjust the flow rate. |
| | b. Blinding the strainer | Call the local CKD agent. (Never disassemble.) | Have it repaired by service man. |
| 6. No signal of the valve position | a. Micro switch is not in the right position. | Check the micro switch and slack of the fixing screw of the mounting bracket. | Adjust the position of micro switch and tighten the fixing screw. |
| | b. Malfunction of the micro switch | Remove wiring of the micro switch, and check conduction at terminals of the micro switch. | Replace the micro switch. |