CKD

SM-50599-A

INSTRUCTION MANUAL

Gas solenoid relief valves

VNR

- 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 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

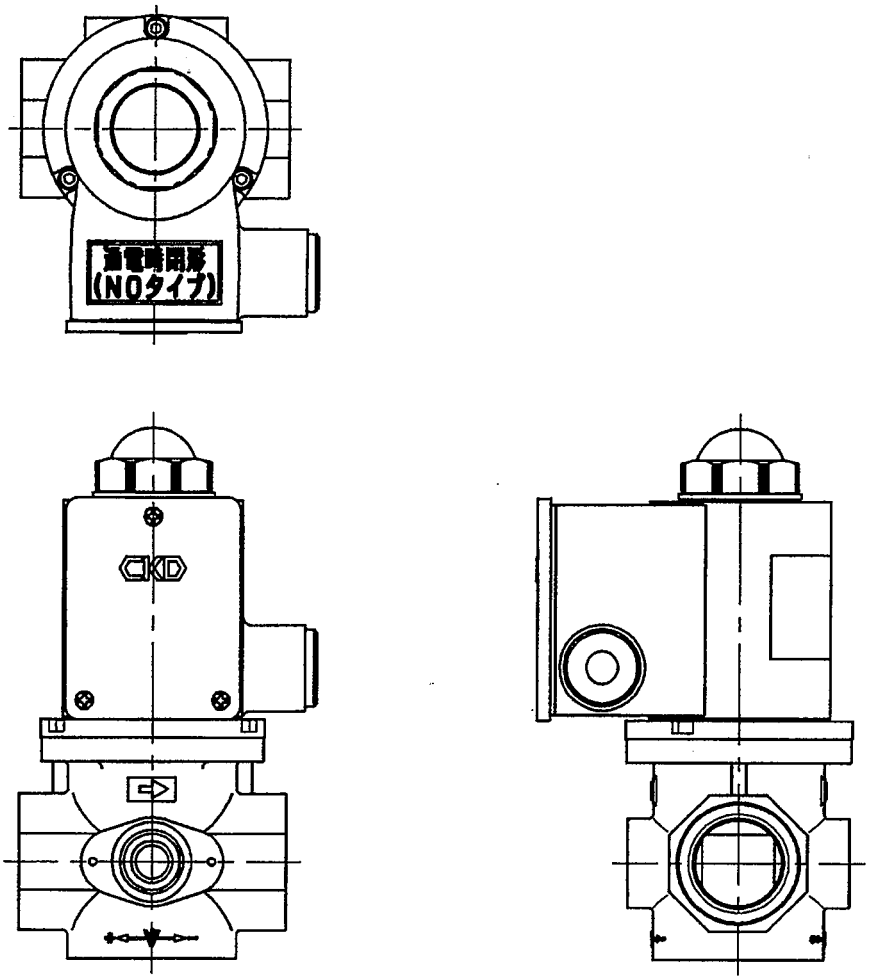
Thank you very much for adopting CKD's gas solenoid relief valve (VNR type).
The product has been manufactured under CKD's strict quality control system.
Since the product is subject to a few operating conditions including temperature, pressure and so on, any user is requested to go through this manual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

Index

1. Initioal confirmation

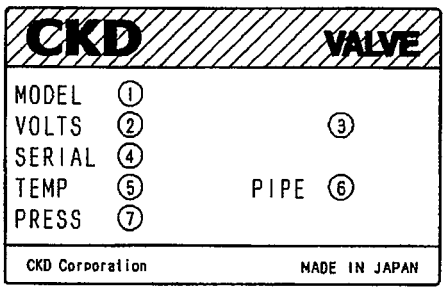
1-1. Confirmation of the product

Confirm that there are no abnormality such as damage and loose screws, could be found during the transportation.



1-2. Confirmation of information on the name plate

Confirm the model type and specifications on the name plate.



① Model type
② Rated voltage
③ Power consumption
④ Serial number
⑤ Ambient temperature
⑥ Nominal size
⑦ Maximum operating pressure

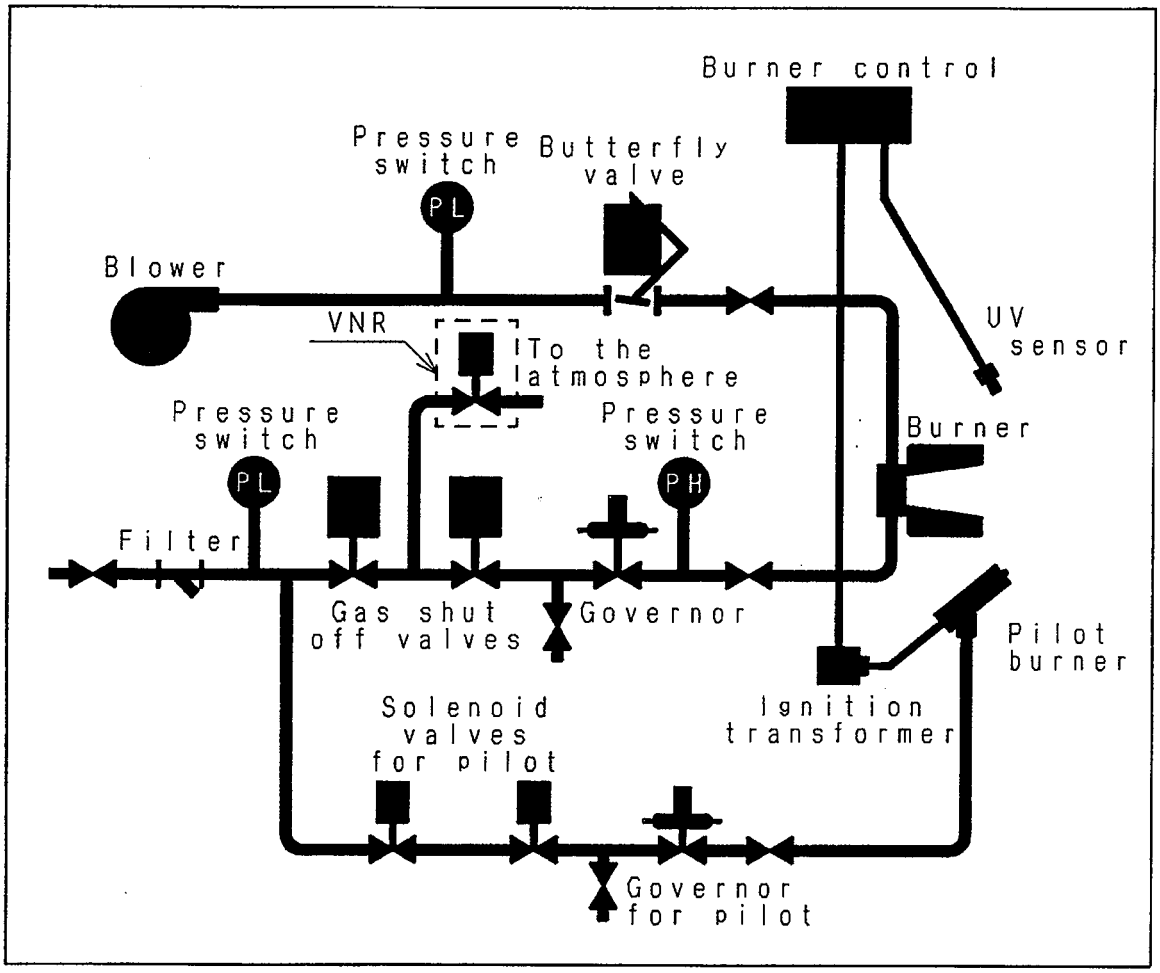
2. Outline

2-1. Application

Gas solenoid relief valves are used in gas circuits for gas combustion installations such as industrial furnaces to prevent inflow of unburned gas into the furnace and discharge the gas to safe place.

An example of application in gas combustion system is shown below.

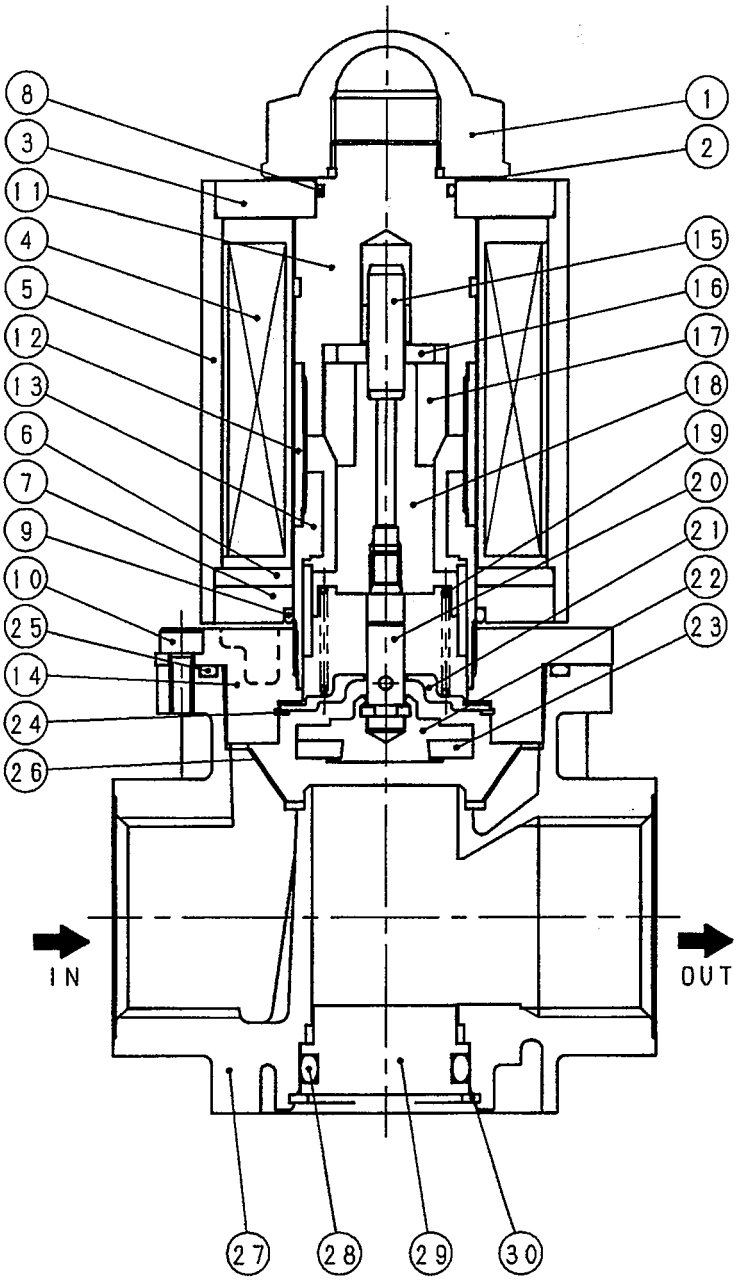
An example of application



2-2. Characteristics

- Electric wiring is easy with the rigid terminal box that has the conduit tube thread conforming to the JIS standard.
- Safe operation is ensured by the DC drive actuator with the built-in rectifier that has eliminated noise and coil burn.
- The improved structure protects the valve from dusts and drips.

2-3. Structure and parts name



No	Parts	
1	Cap	
2	Coned disk spring	
3	Ring core A	Actuator
4	Coil	
5	Bonnet	
6	Ring core C	
7	Ring core B	
8	O-ring	
9	O-ring	
10	Hexagon socket head cap screw	
11	Core	Core and pipe assembly
12	Seamless pipe	
13	Plunger guide	
14	Body cover	
15	Plunger shaft	Armature assembly
16	Disk	
17	Iron core	
18	Plunger	
19	Spring	
20	Valve spindle	
21	Spring supporting disk	
22	Disk holder	
23	Valve disk	
24	Retaining ring-C type or Retaining ring	
25	O-ring	
26	Strainer	
27	Body	Body assembly
28	O-ring	
29	Bottom plug	
30	Retaining ring-C type	

2-4. Principle of operation

- Opening the valve
  When shutting down the main voltage to the coil, the plunger will return to original position by the spring force, thus opens the valve and the fluid flows from IN side to OUT side.
- Closing the valve
  When applying the main voltage to the coil, the iron core will be attracted to plunger guide, thus closes the valve and shuts off the flow.

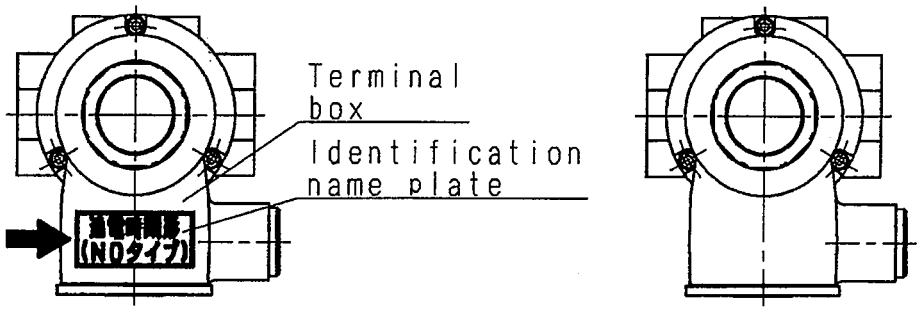
2-5. Identifying

Gas solenoid relief valves (VNR type) are similar to gas solenoid valves (VNA type).
These valves are identified by 3 parts below.

① Identification name plate on the terminal box

VNR ・・・There is an identification name plate.

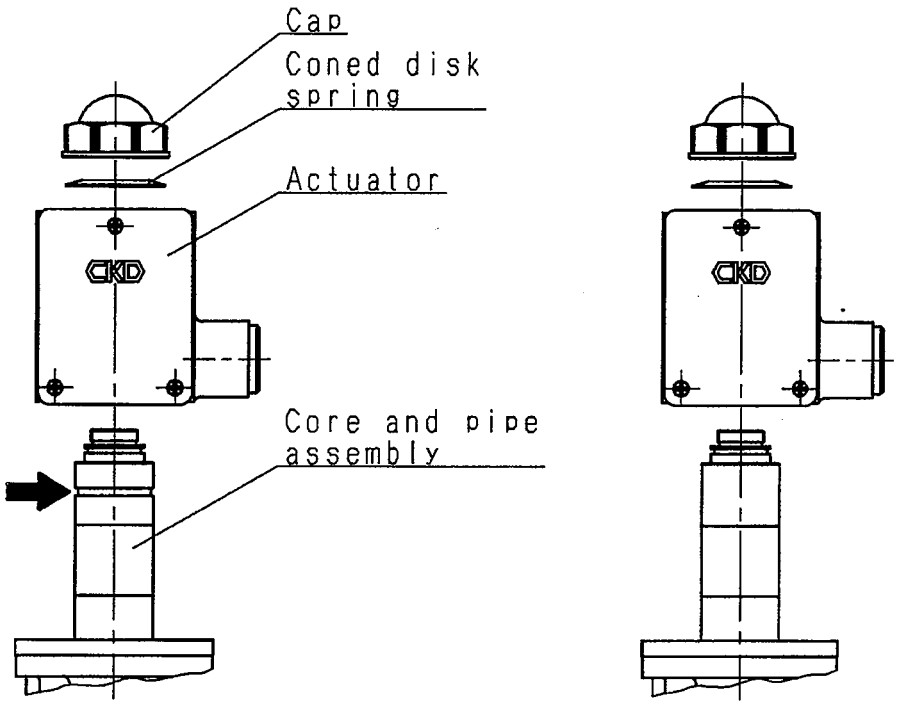
VNA ・・・No identification name plate.



② Groove at upper part of the core and pipe assembly

VNR ・・・There is a groove.

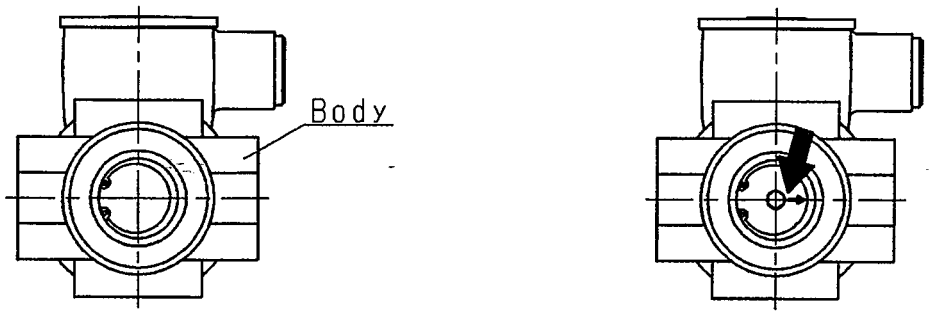
VNA ・・・No groove.



③ Bottom of the body (Hexagon socket and arrow)

VNR ・・・No hexagon socket and no arrow.

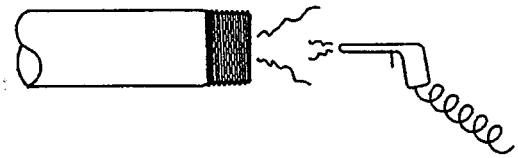
VNA ・・・There are hexagon socket and arrow.



3. Instructions about installation

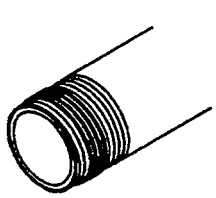
3-1. Air flushing

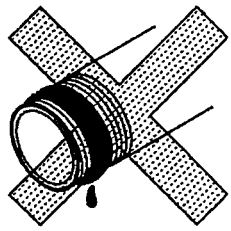
Before fitting the valve to the pipe work, flush inside of the pipe by compressed air and remove the metal dusts.



3-2. Sealing

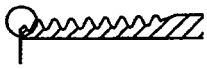
Use Gas Company authorized sealant, and paste them from 2nd pitch, and make sure that the sealant never goes into the pipe.

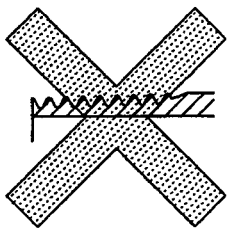




3-3. Length of pipe thread

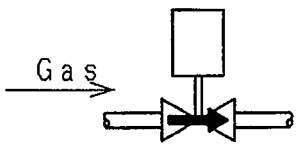
Pay attention to keep the length of the useful thread. If it's too long or too short, it may cause leakage. You may file first half pitch of the pipe thread.

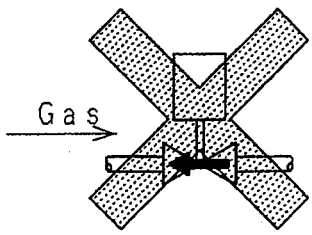




3-4. Flow direction

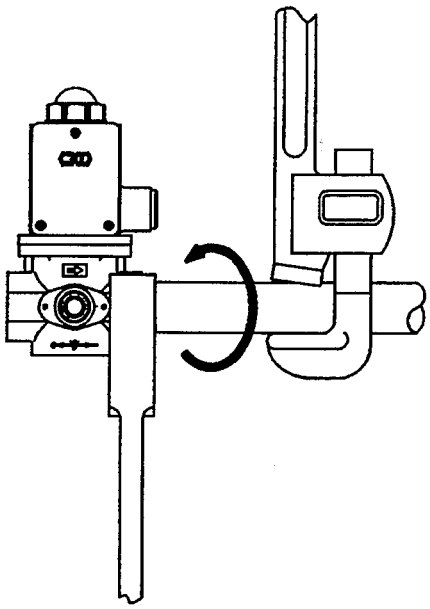
The direction of the gas flow must correspond to the arrow on the valve body.

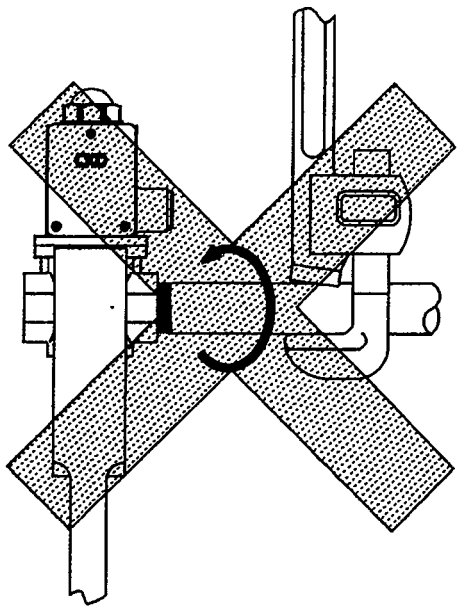




3-5. Installation to pipe work

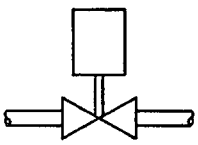
When fitting the valve to the pipe work, use a suitable spanner at the width across flats of the body. Don't chuck other parts (Actuator and other part of the body).



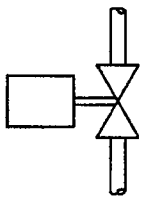


3-6. Mounting posture

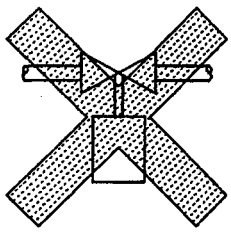
Mount the valve vertically with the actuator upright or mount the valve horizontally with the actuator in level without any slant.



Vertical



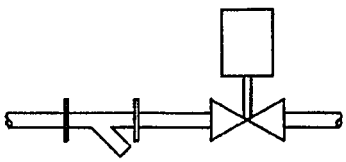
horizontal

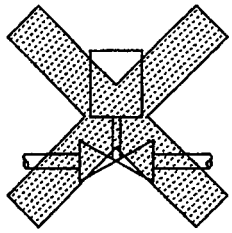


Vertical

3-7. Installation of filter

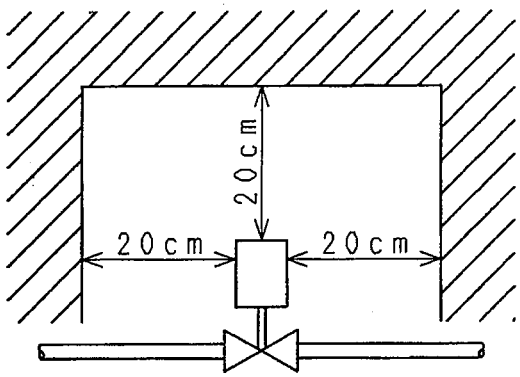
Install a filter upstream of the valve, and filtrate dusts.





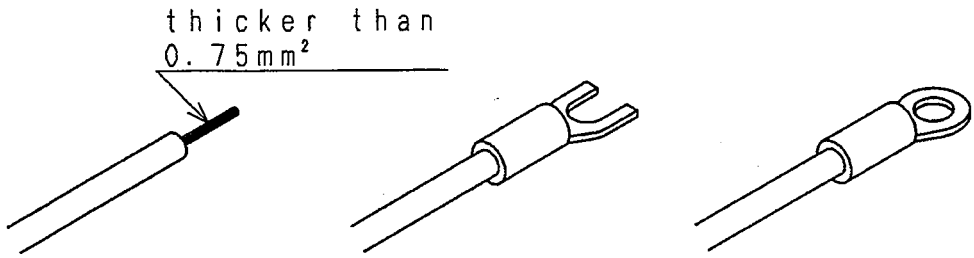
3-8. Space around the valve

For the convenience of daily inspection and maintenance, make space about 20cm around the valve.



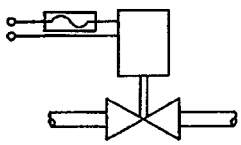
3-9. Electric wires

Use those wires more thicker than 0.75mm^2 of nominal cross sectional area of the conductor, and prepare the U shape terminal or ring tongue type terminal (for M4 screw) and tight.



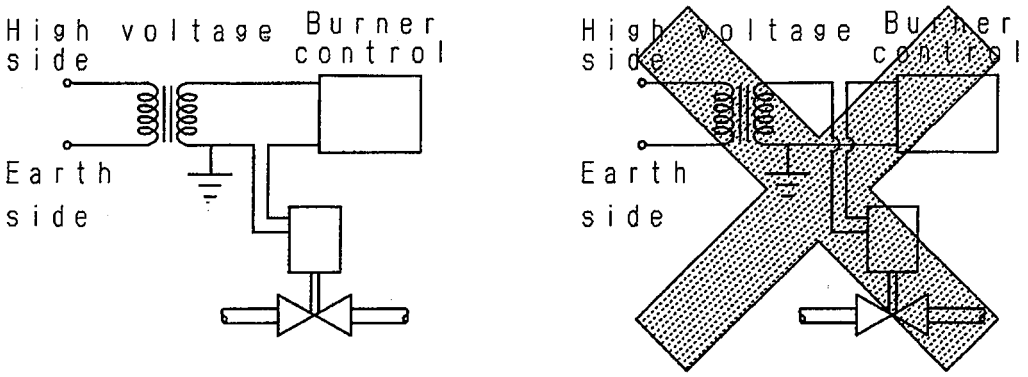
3-10. Insertion of fuse

Use suitable fuse when applying to the valve.

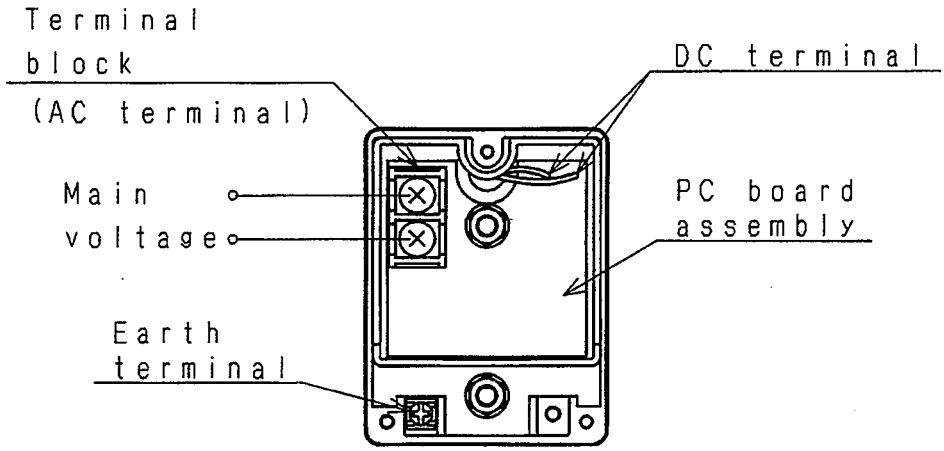


3-11. Connecting main voltage line

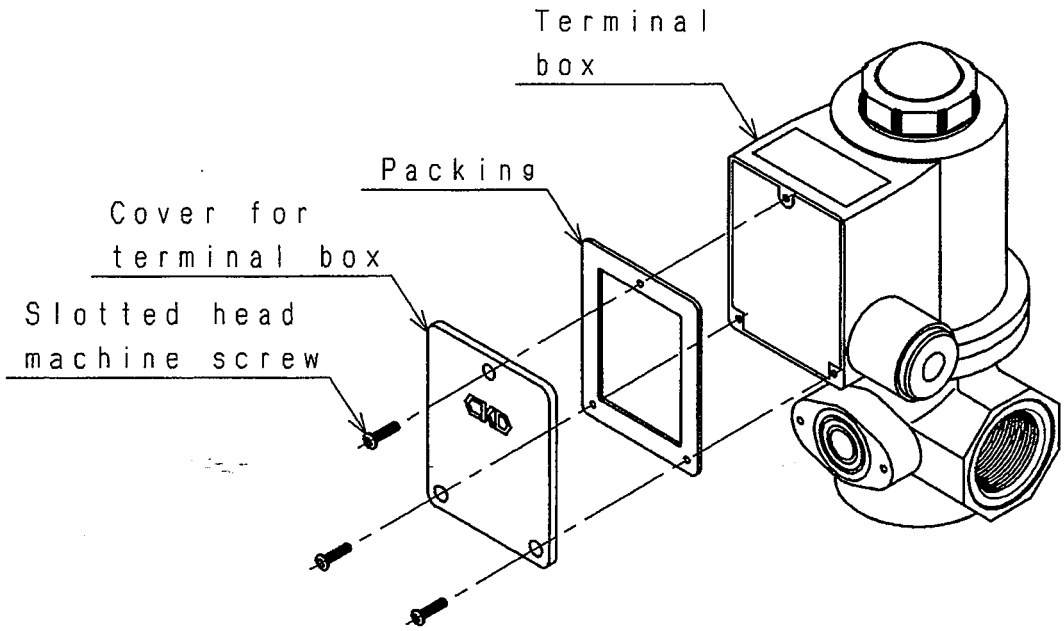
Connect the valve to main voltage line according to the following circuit diagram.



For connecting to the terminal block of the valve, remove the cover of the terminal box, drag the wires through conduit CTC19, and connect them to the terminals. Tighten the terminal screws with torque 1.4N·m. For preventing electric shocks from unexpected leakage of electricity, earth the valve via earth terminal.

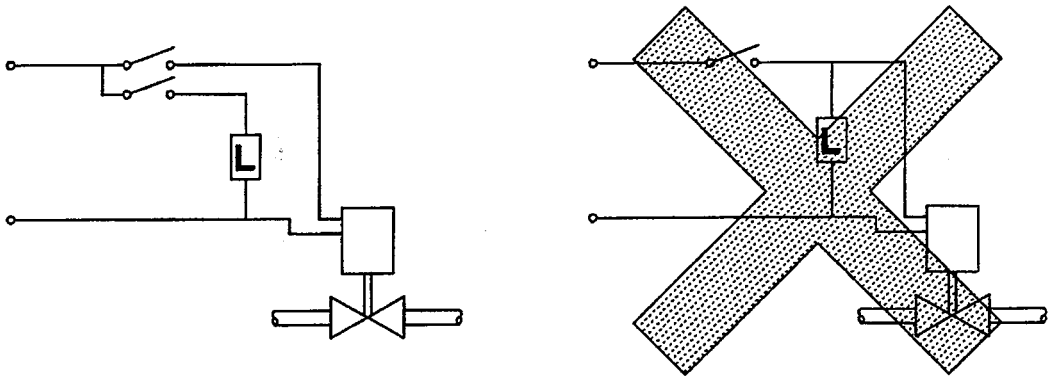


After connecting, restore the cover of the terminal box again. Tighten the screws of the cover with torque from 0.3 N·m to 0.5 N·m.



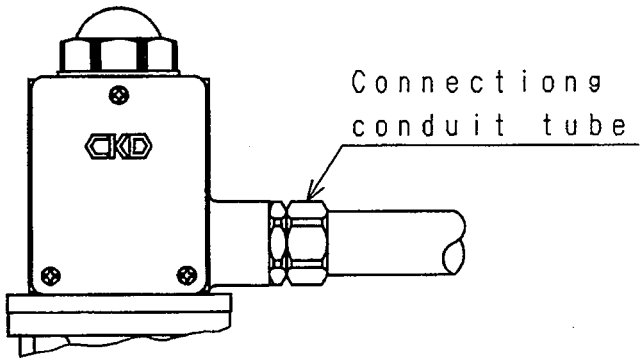
3-12. Surge voltage prevention

When connecting the valve parallel to inductive load, it is necessary to install the valve like as the following circuit diagram to prevent the surge voltage to affect the valve.



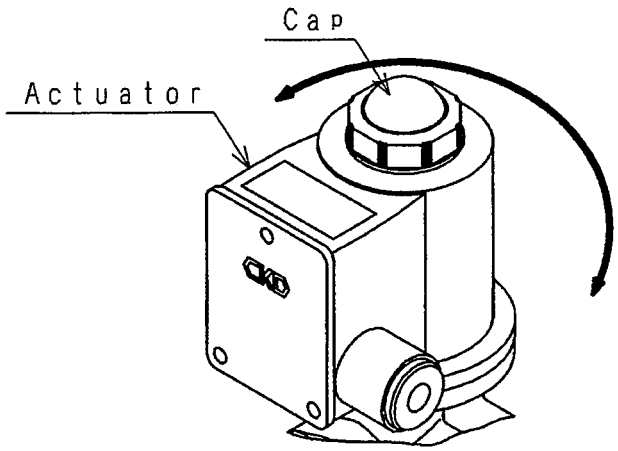
3-13. Connecting conduit tube

We recommend the use of conduit tubes to protect and to bind the wires.



3-14. Changing actuator direction

The terminal box can be rotated 360° to the desired position by loosening the locking cap on the top of the valve. After that, retighten the locking cap again.



3-15. Storage

In case of not using the product immediately, restore the product into the package again and resume package status, and store it in not much high temperature and not much humid place.

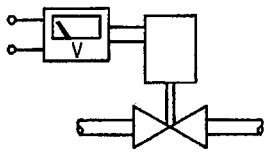
4. Instructions about commissioning

4-1. Confirmation of specifications

Confirm whether a few operating conditions of voltage, pressure and temperature conform to the specifications of the valve.

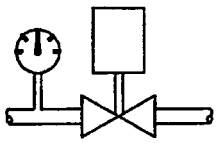
- Main voltage

  Main voltage must be within applicable voltage range (Rated voltage –15～+10%).

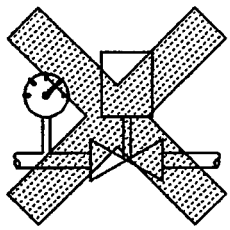


- Operating pressure

  Inlet pressure must be within operating pressure range (0～20kPa).



Under max. operating pressure

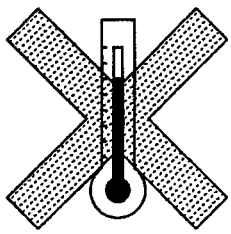


Over max. operating pressure

- Ambient temperature

  Ambient temperature must be within allowed range (-20～+60℃).

Within the limit of ambient temperature



Beyond the limit of ambient temperature

4-2. Operation check

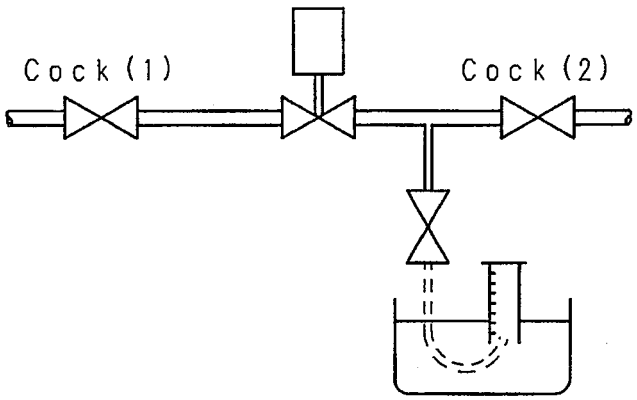
Apply main voltage to the valve, and confirm the operation of the valve.

When applying the main voltage, the valve opens. When shutting down the main voltage, the valve closes.

4-3. 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
  Apply main voltage and close the valve, then open cock (1) and close 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.



5. 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 industrial gas combustion equipment "
" Guide line for the safe operation of gas boiler combustion equipment "
" Guide line for the safe operation of gas engine for power generation "

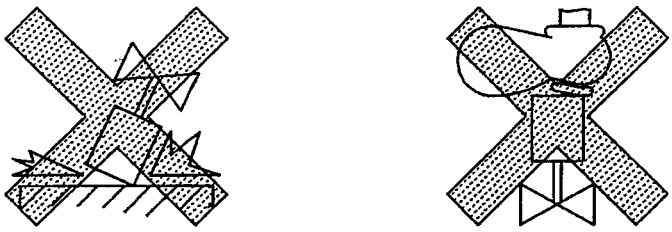
6. Trouble shooting

Trouble	Cause	Check	Remedy
1. The valve does not close.	a. Malfunction of the electric control circuit	Measure the voltage with AC terminals on the p.c. board assembly (see 3-11. of page 10). Applicable voltage range: AC100V/AC200V, -15~+10%	If measured voltage is not within the applicable voltage range, inspect and repair the circuit.
	b. Malfunction of the p.c. board	Measure the voltage with DC terminals on the p.c. board assembly (see 3-11. of page 10). Applicable voltage range: AC100V → approx. DC90V AC200V → approx. DC180V Tolerance: -15~+10%	If measured voltage is not within the applicable voltage range, replace either p.c. board assembly or actuator.
	c. Burnt out coil, short-circuit layer	Shut down main voltage, measure coil resistance with DC terminals on the p.c. board assembly. (Unit : Ω) Nominal size AC100V AC200V 15A 360 1267 20/25A 315 1231 32/40A 186 777 Tolerance: -5~+5% at 20°C	If measured voltage is not within the applicable voltage range, replace actuator.
	d. Odd material sticks to the valve disk.	Call the local CKD agent. (Never disassemble.)	Replace the valve or have it repaired by service man.
2. The valve does not open.	a. Malfunction of the electric circuit	Measure the voltage with AC terminals on the p.c. board assembly.	If the voltage is applied, inspect and repair the circuit.
	b. Excess gas pressure applied.	Check if the inlet pressure is in excess of the max. operating pressure.	Inspect and repair the governor.
3. Leakage	a. Leakage from the pipe connection	Check the leakage from the pipe connection.	Repair the seal of the pipe connection.
	b. Odd material sticks to the valve disk or the valve seat, and breakage.	Call the local CKD agent. (Never disassemble.)	Replace the valve or have it repaired by service man.
4. Low flow rate	a. Blinding the strainer	Call the local CKD agent. (Never disassemble.)	Replace the valve or have it repaired by service man.

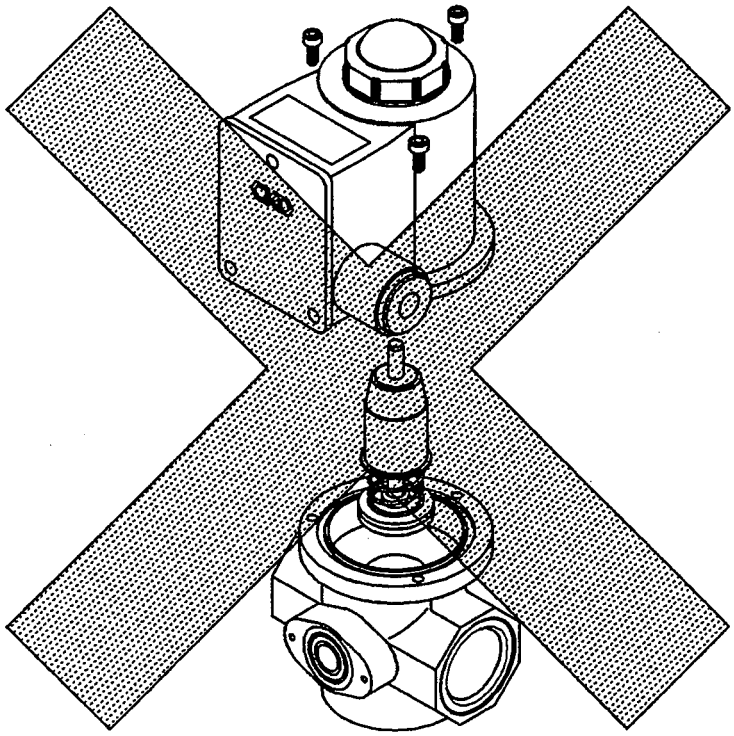
7. Other prohibited handling

For proper operation, don't handle the valve by the way mentioned below.

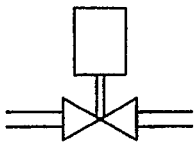
- Don't drop the valve and don't step on the valve.



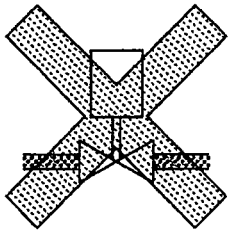
- Don't modify, disassemble and repair the valve by yourself.



- Don't use the valve with the fluid except for Town gas, Natural gas and LPG.



Town gas, Natural gas and LPG

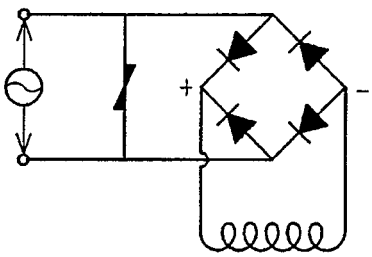


Other fluid

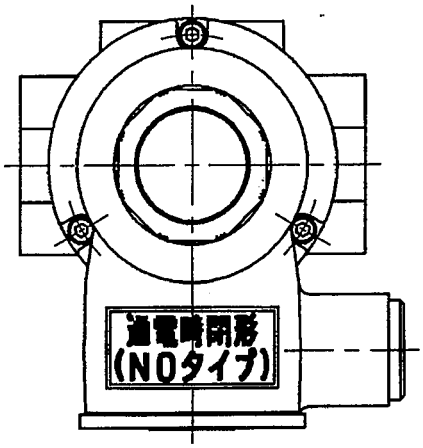
8. Specifications

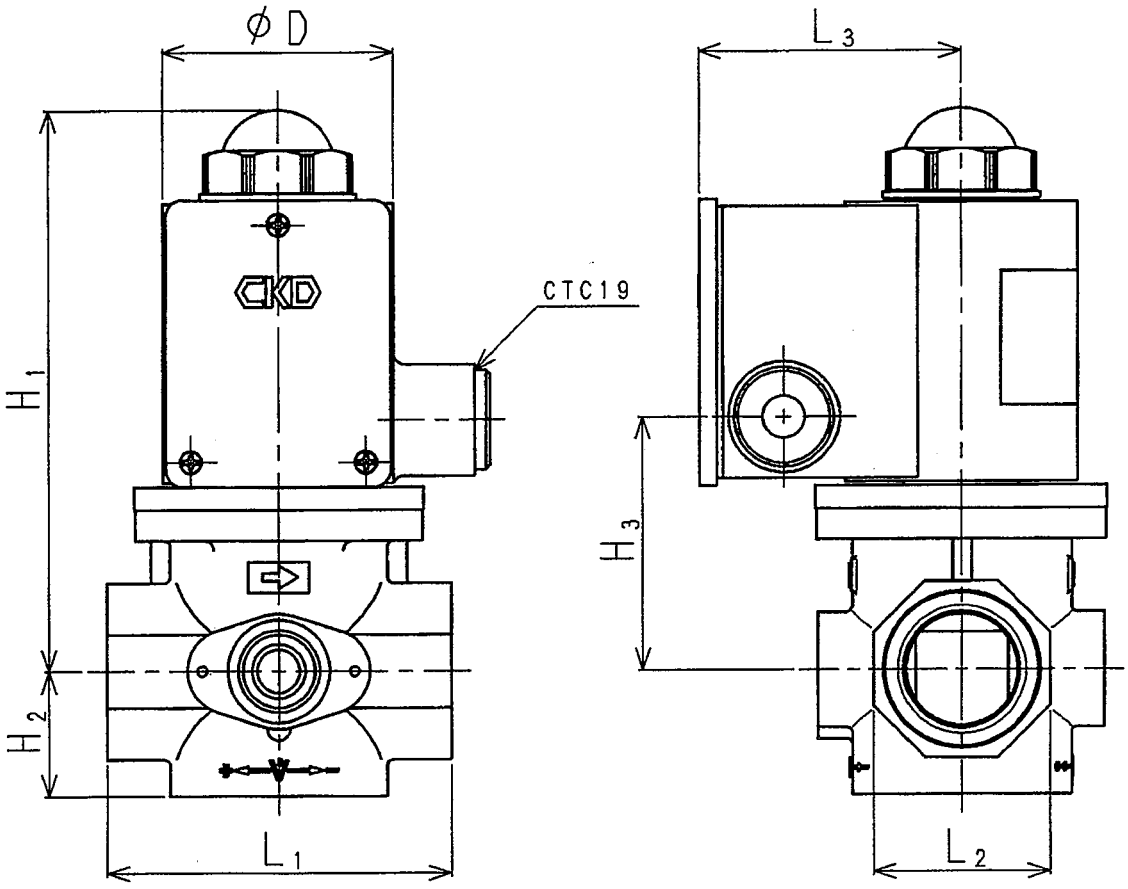
Item \ Type		VNR-15	VNR-20	VNR-25	VNR-32	VNR-40
Applicable gases	-	Town gas, Natural gas, Liquefied petroleum gas				
Operating pressure range	kPa	0～20				
Flow rate Natural gas, s.g.=0.65 ΔP=0.25kPa	m^3/h	5.8	11.7	12.7	16.6	17.2
Applicable voltage	V	AC100V/AC200V, -15～+10%				
Power consumption	VA	31			50	
Applicable frequency	Hz	50/60 commonly applicable				
Ambient temperature	℃	-20～+60℃ shall not be frozen				
Storage temperature	℃	-20～+60℃				
Operating time s	Closing	Below 1				
	Opening	Approx. 0.5				
Operation frequency	Cycles/min	Below 30				
Mounting posture		Mount the valve vertically with the actuator upright or mount the valve horizontally with the actuator in level.				
Connection		Threaded end (Rp)				
Nominal size		15A	20A	25A	32A	40A
Weight	kg	1.6	2.3	2.2	3.4	3.3

Electric circuit (AC)



Dimensions





Type / Symbol	H_1	H_2	H_3	L_1	L_2	L_3	ΦD
VNR-15	132	24	52	69	32	63	50
VNR-20	146	33	66	89	46	68	60.5
VNR-25	146	33	66	89	46	68	60.5
VNR-32	165	40	84	128	65	73	70
VNR-40	165	40	84	128	65	73	70