CKD

SM-50513-A/1

INSTRUCTION MANUAL

FOR

Safety gas train for middle pressure

Model TAC-25

(VNM-25·VLM-25·C25N-B)

- 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 meterial, fluid, piping electricity regarding Control Valves (solenoid valves, motor valves, air operated valves and so on.) or other products.

Never use this Product by those who have no knowledge or are not well training.

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 the product, 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 paticularly "Class H" coil where may have a high tenperature.

- There my have electric shock when wire connecting portion of solenoid valves or motor valves are touched. In case of 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.

Contents

1. Specifications

1-1. Solenoid valve (Quick opening, Slow opening)

Type / Item No.	VNM - 25 (Quick opening)	VLM - 25 (Slow opening)
Flange shape	JIS 10K 25A RF	
Applicable gases	Town gas, Natural gas, Liquefied petroleum gas	
Operating pressure	0.3 MPa or less	
Cv value	12.8	
Rated voltage	AC 100 V , 200V , 50/60 Hz	
Power consumption	82 VA or less	
Ambient temperature	−20 ~ +60 °C provided that the valve inside and sliding part shall not be frozen.	
Valve opening time	Bellow 0.5 second	About 10 seconds
Valve closing time	Bellow 1 second	
Operation frequency	Bellow 30 cycles / min	Bellow 1 cycle / min
Start gas flow adjustment range	———	0 ~ 50 %
Insulation type	Class H	
Coil temperature rise	Bellow 115 °C	
Valve mounting posture	Mount the valve vertically with the coil up right or mount the valve horizontally with the coil in level without any slant.	
Weight	7.7 kg	7.8 kg

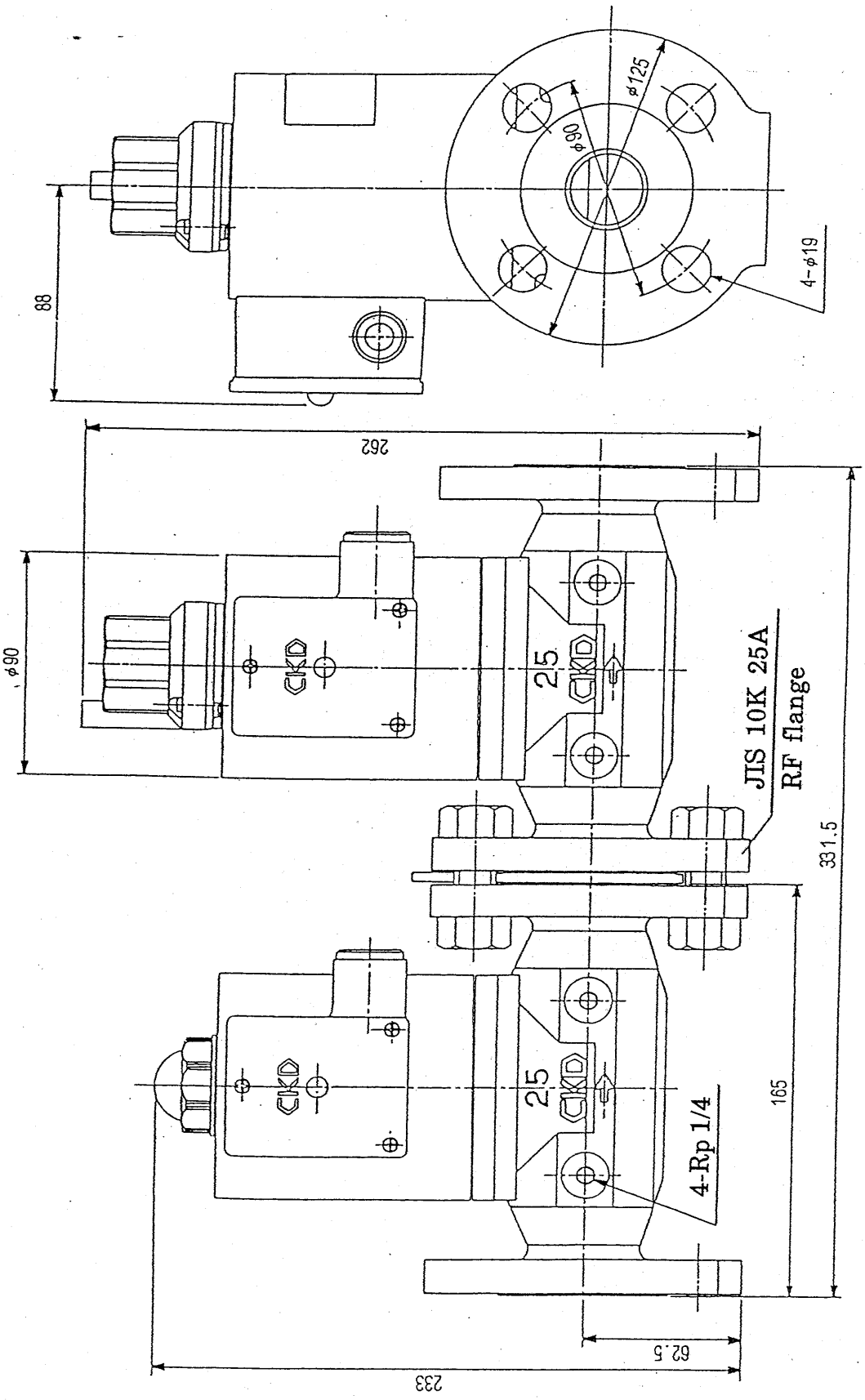
1-2. Gas governor

Type / Item No.		C25N - B	
Applicable gases		Town gas, Natural gas, Liquefied petroleum gas	
Inlet pressure		0.1 ~ 0.2 MPa	0.1 ~ 0.3 MPa
Outlet pressure		1.5 ~ 5 kPa	5 ~ 60 kPa
Flow rate (With natural gas of specific gravity 0.65)		2 ~ 40 m³/h(ANR)	10 ~ 120 m³/h(ANR)
Ambient temperature allowed		−20 ~ +60 °C provided that the valve inside and sliding part shall not be frozen.	
Flange shape	Inlet	JIS 10K 25A RF	
	Outlet	JIS 10K 40A RF	
Weight		7.5 kg	

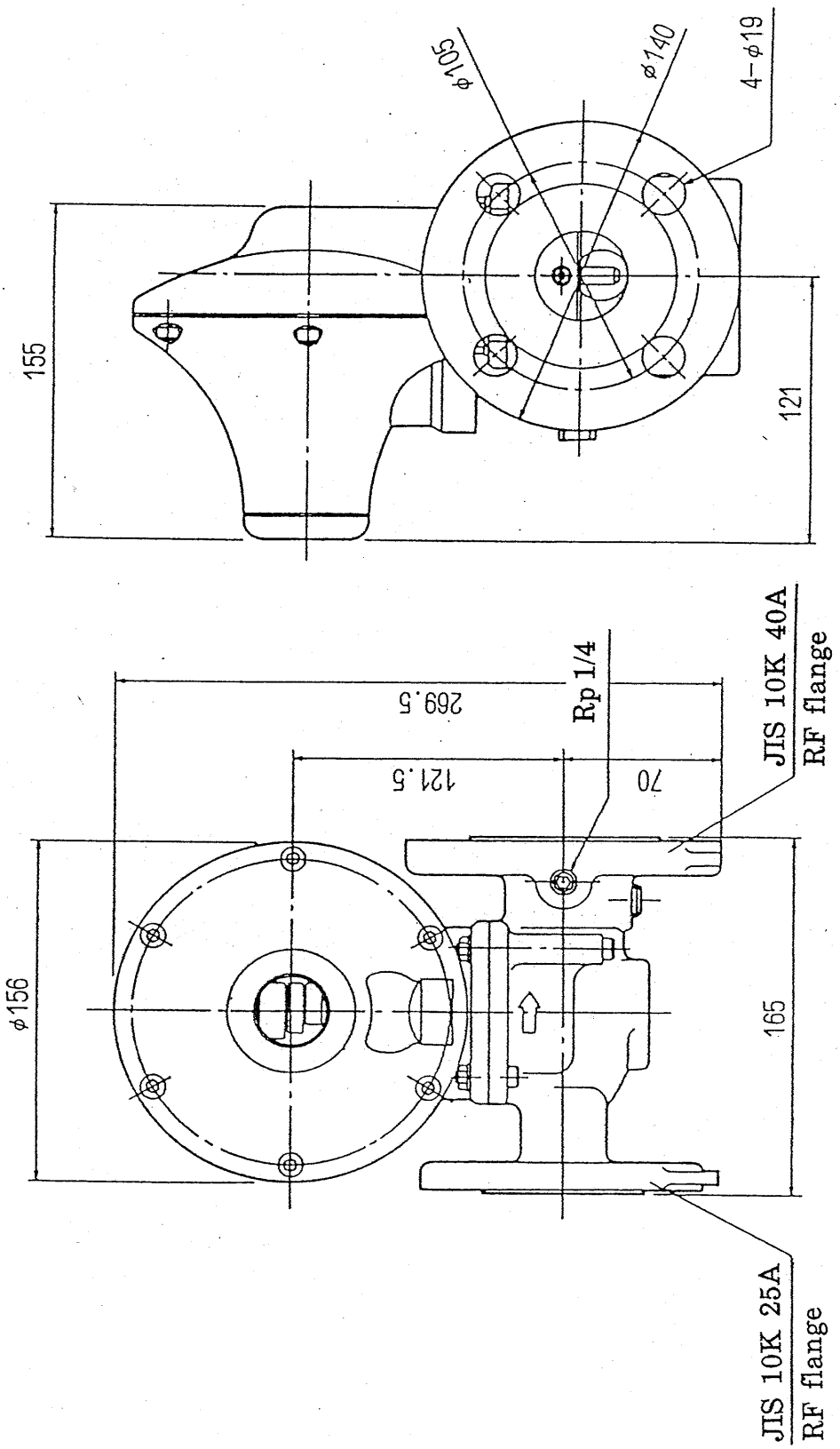
Booster pipe installation	
Outlet pressure kPa	Booster pipe
1.5 - 15	Nothing
15 - 25	Pipe for medium pressure
25 - 60	Pipe for middle pressure

External dimension drawing

- Solenoid valve
  (VNM · VLM)



- Gas governor (C25N - B)

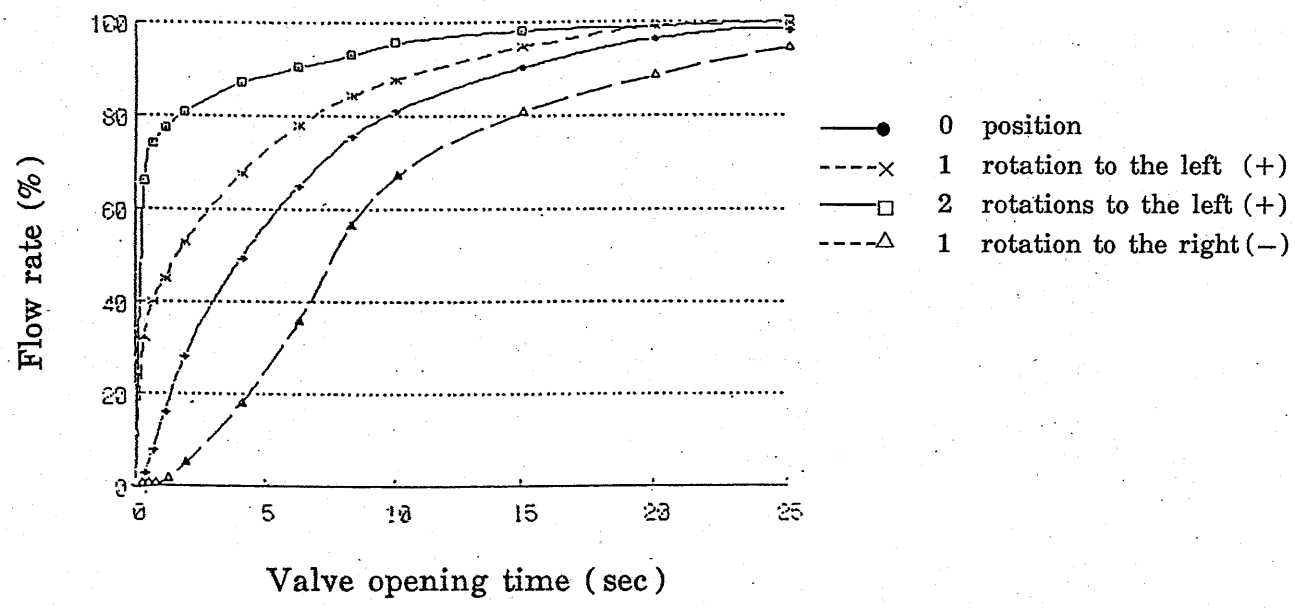


2. Adjusting procedure

2-1. Start gas adjusting procedure (VLM only)

(1) VLM-25 slow open characteristics (typical value)

Relation between rotation number of damping unit and flow rate
Temperature conditions : 20 °C
Pressure conditions : P_1 = 5 kPa
$\triangle P$ = 0.1 kPa



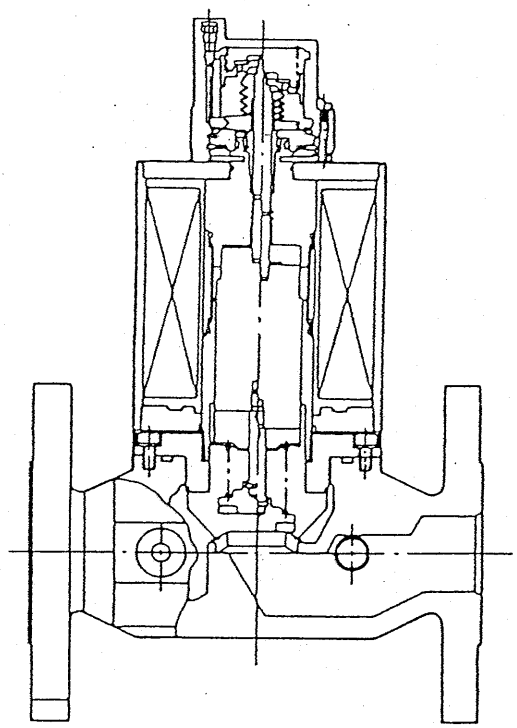
High differential pressure and low flow rates are regulated by three serial units (VNM + VLM + C25N - B), when a slow ignition is needed, rotate the VLM damping unit clockwise a maximum of one rotation to achieve a smoother ignition.

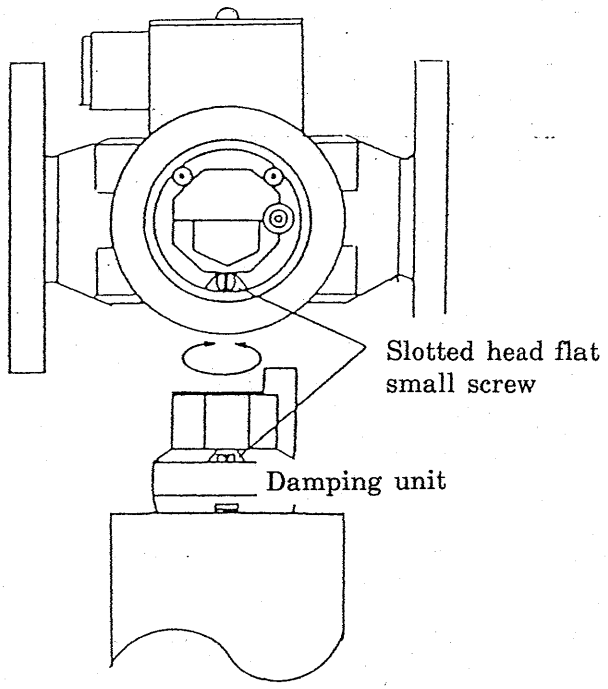
CAUTION

Use caution, if the daming unit is rotated more than needed, the internal parts will be damaged and adjustment will be impossible.

(The damping unit is fitted with a mechanical stopper designed to stop it after approximately 1 turn in the clockwise direction and approximately 3 turns in the counter- clockwise direction.)

(2) Start gas adjusting procedure





To adjust the start gas, turn the damping unit as in the figure to change the start gas.

① Loosen the slotted head flat small screw.
② By turning the damping unit counter-clockwise, the start gas increases.
③ Retighten the slotted head flat small screw each time of adjustment.
④ The start gas rate adjusting range is 0 to 50 % of the maximum flow rate.

<Precautions on the start gas adjustment>
① The start gas rate is set to 0 at the time of shipment.
② Loosen the slotted head flat small screw but do not fully unscrew. Never loosen other screws (those which heads are painted in red)
③ Adjust the rotation number of damping unit about 3 rotation ranges counter-clockwise from 0 position. Excessive force applied beyond this range can cause deformation of the metal fittings of the damping unit.

2-2. Adjusting governor secondary pressure
(Adjust pressure at designated flow rate.)

(1) When you need to raise the secondary pressure
Remove the upper cap and while monitoring the secondary pressure, rotate the adjusting nut clockwise as seen from the top with the flat spanner wrench (option).
Use caution,avoid turning too far so that the adjust spring does not become fully compressed.

(2) When you need to lower the secondary pressure
Remove the upper cap and while monitoring the secondary pressure, rotate the adjustment nut counterclokwise as seen from the top with the flat spanner wrench (option).

2-3. Replacing the spring

(1) Remove the upper cap and rotate the adjusting nut counterclokwise as seen from the top with the flat spanner wrench (option) and remove the spring.

(2) Replace with a spring that meet specifications, fit on the adjusting nut and rotate clockwise as seen from the top with the flat spanner wrench (option) while pressing in on the spring.

Caution
When removing or installing the nut holding down the spring avoid possible injury from the force of the spring that may fly outwards.
(Take particular care when a high secondary pressure is used.)

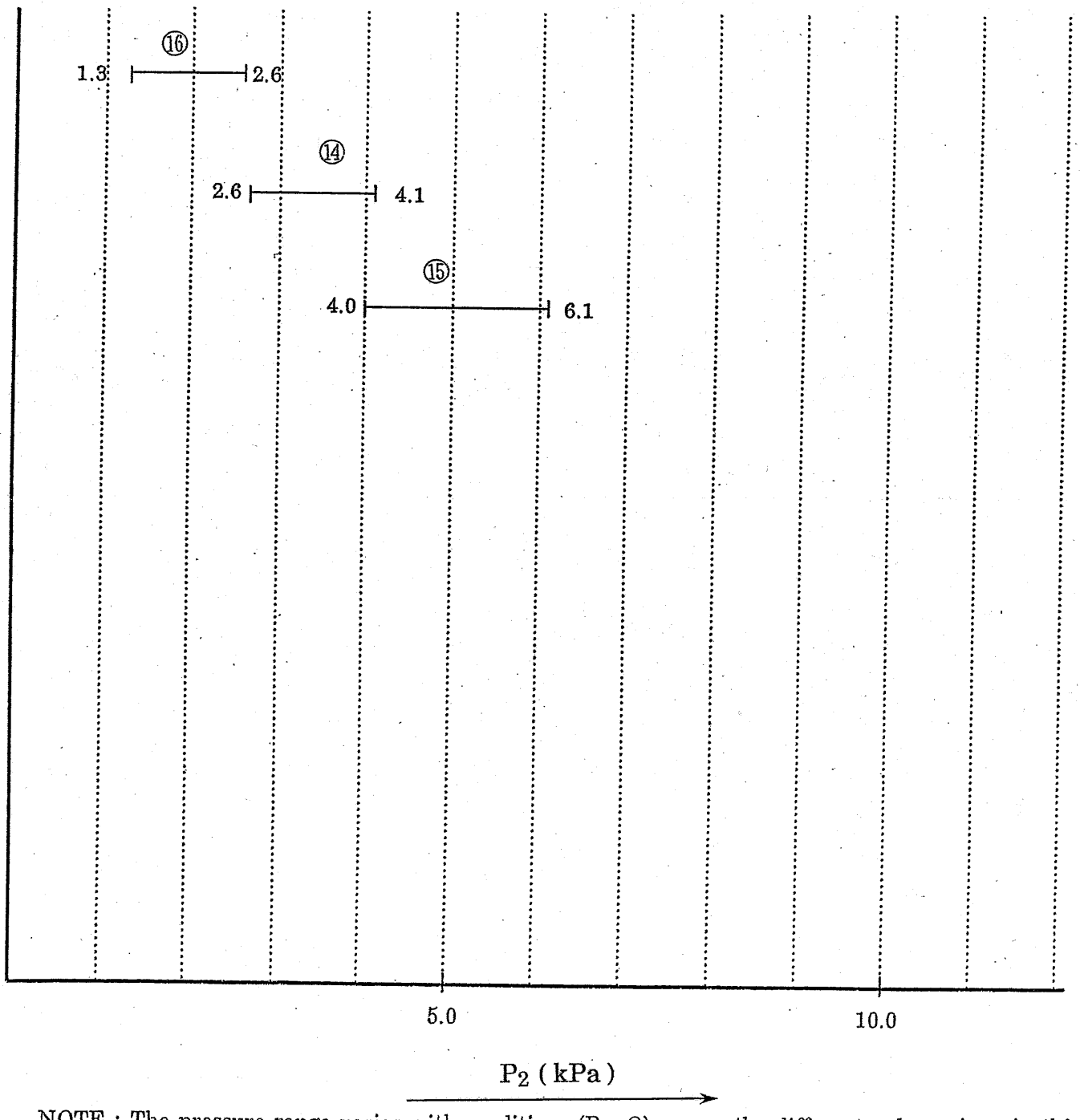
Gas governor C25N - B spring tables

1). Spring No. / Spring color

Spring No.	⑭	⑮	⑯
Spring color	light brown	orange	nothing

2). Pressure range

(Conditions $P_1 = 0.1$ MPa , $Q = 40$ m³/h (Air))



NOTE : The pressure range varies with conditions (P_1, Q) so use the different values given in this table as a general guide.

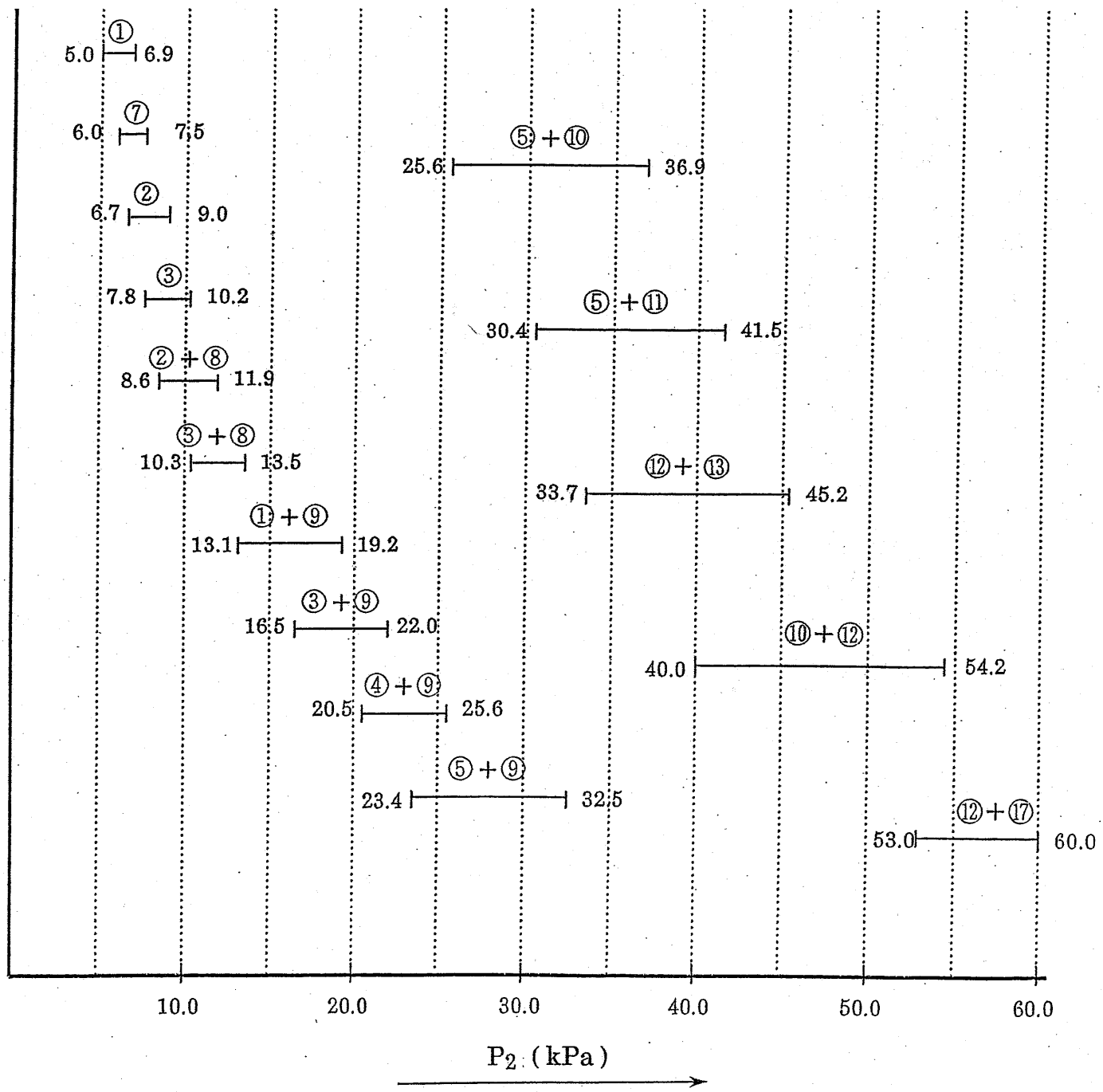
Gas governor C25N-B spring tables

1). Spring No. / Spring color

Spring No.	①	②	③	④	⑤	⑥	⑦	⑧	⑨	⑩	⑪	⑫	⑬	⑰
Spring color	white	yellow	red	blue	black	nothing	green	light blue	pink	purple	yellow green	silver	brown	nothing

2). Pressure range

(Conditions $P_1 = 0.1$ MPa , $Q = 50\ m^3/h$ (Air))

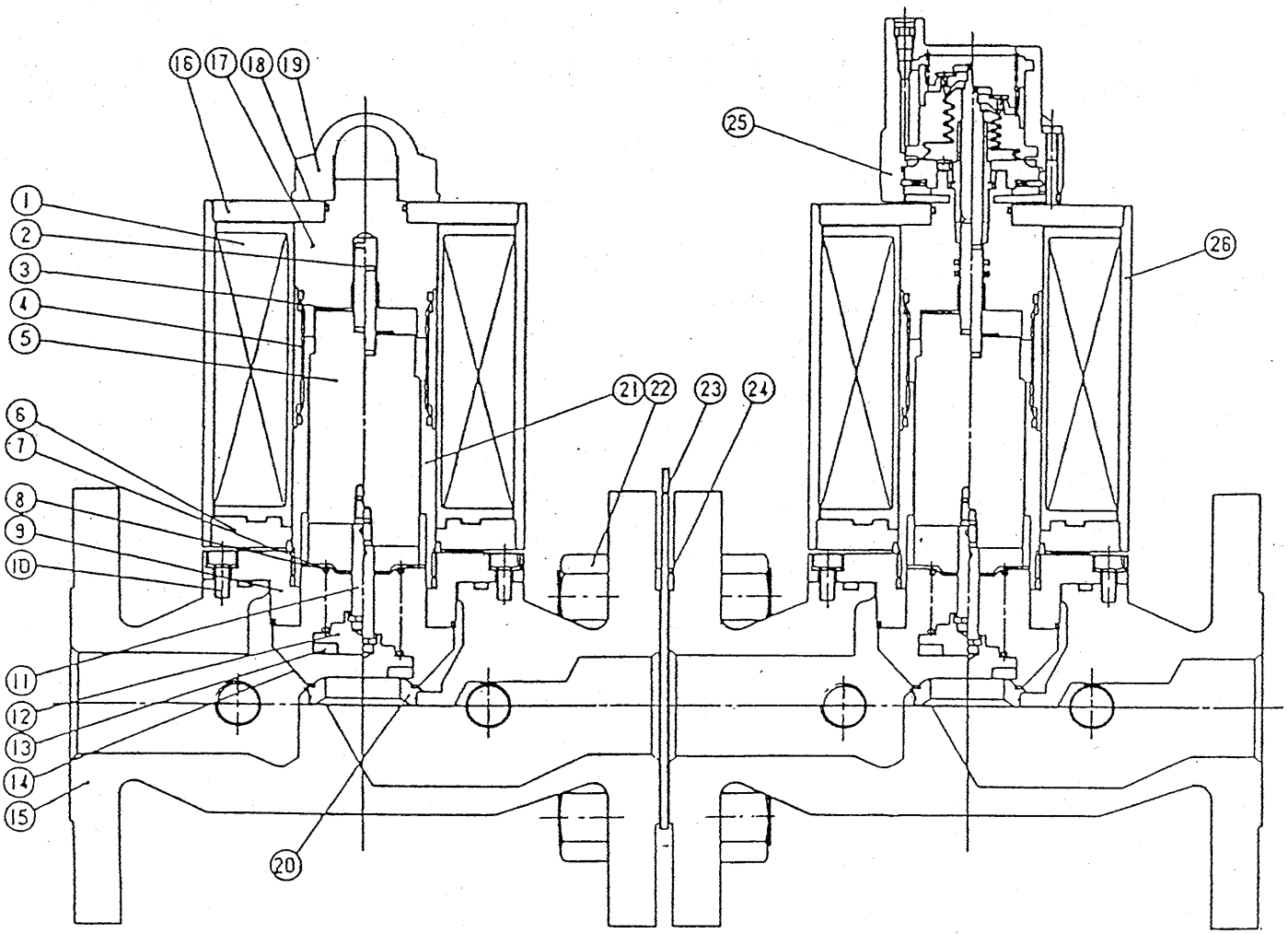


NOTE : The pressure range varies with conditions (P_1, Q) so use the different values given in this table as a general guide.

3. Internal structural drawing

3-1. Solenoid valve (VNM · VLM)

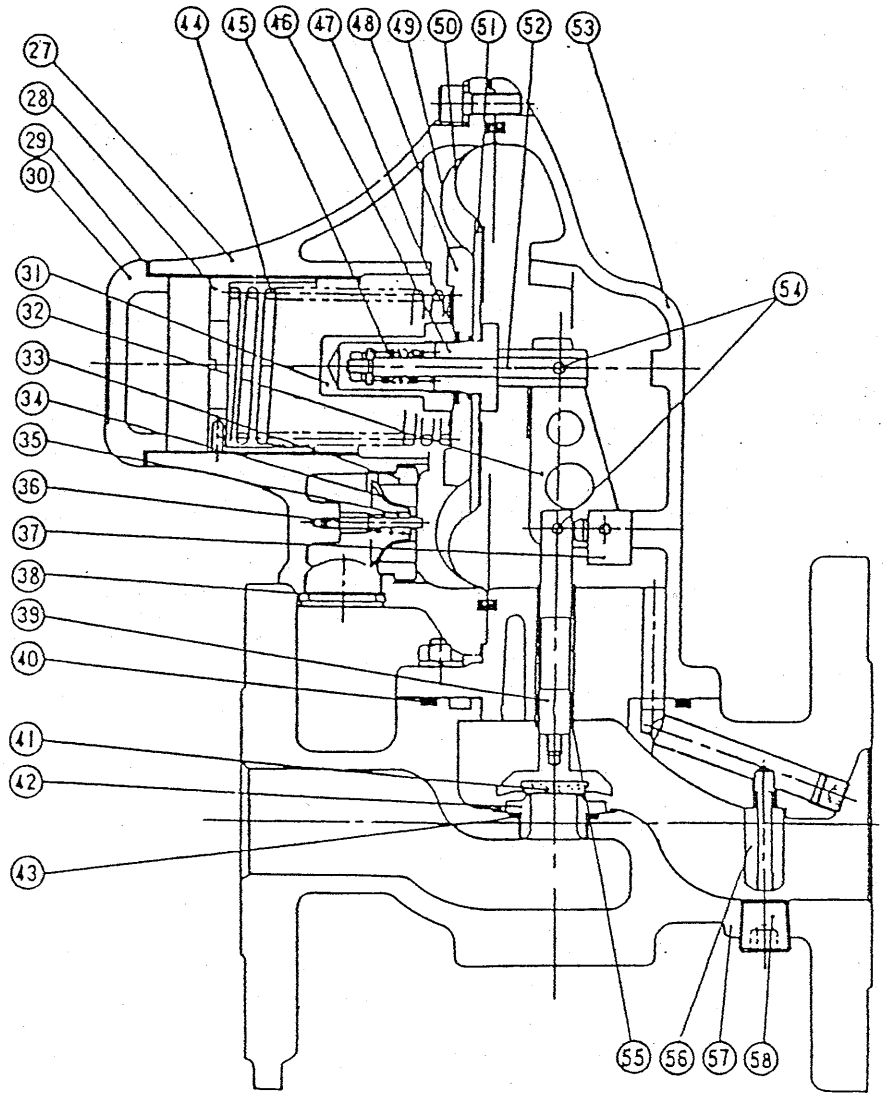
1. Coil	10. Hexagon socket head cap screw	19. Cap
2. Plunger shaft	11. Valve spindle	20. Valve seat
3. Disk	12. Seat holder	21. Plunger guide
4. Seamless pipe	13. Valve disk	22. Hexagon nut
5. Plunger	14. Filter	23. Gasket
6. Ring core B	15. Body	24. Stud bolt
7. Spring supporting disk	16. Ring core A	25. Damping unit
8. Closing spring	17. Core	26. Bonnet
9. Body cover	18. Coned disk spring	



VNM VLM

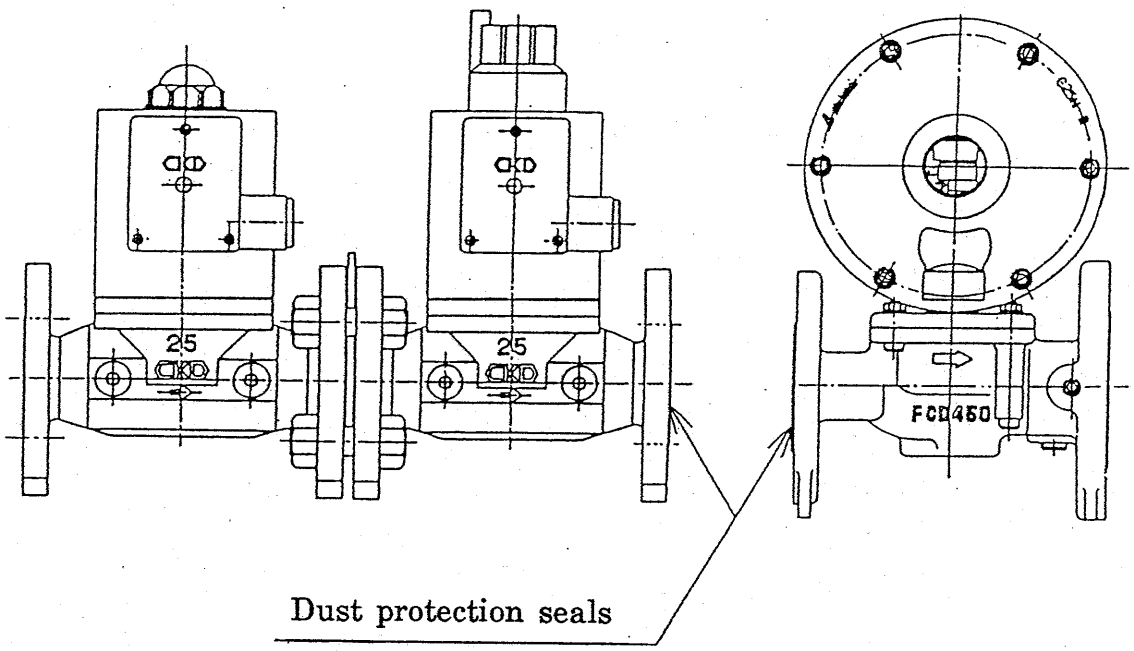
3-2. Gas governor (C25N - B)

27. Upper case
28. Adjusting nut
29. Gasket
30. Upper cap
31. Sub cap
32. Lever
33. Stabilizer seat
34. Stabilizer
35. Stabilizer spring
36. Stabilizer stem
37. Bracket
38. Vent screen
39. Valve stem
40. O - ring
41. Valve
42. Orifice
43. O - ring
44. Spring
45. Diaphragm stem spring
46. Guide bushing
47. O - ring
48. Safety diaphragm pan
49. Safety diaphragm
50. Diaphragm
51. Diaphragm pan
52. Diaphragm stem
53. Lower case
54. Pin
55. Stem bushing
56. Booster pipe
57. Body
58. Plug



4. Transportation and storage

The products transported from CKD's factory have dust protection seals to prevent dust and dirt from entering the internal side. Do not remove the seals even after unpacking until the time of installing the piping.



In case of storing it for a certain period of time with the case unpacked, store the goods at a position free of moisture or corrosive gas.

5. Installation and piping work

5-1. Installing position

The product is designed for in-door installation.
When installing, care should be taken in the following points.

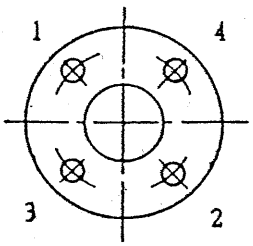
(1) Install the valve at a position easily accessible for daily inspection and maintenance. (Keep the space of more than 200mm over the products.)
(2) Install the valve away from direct sunlight, in a place where ambient temperature does not become less than −20 °C and more than 60 °C.
(3) Avoid a place where rain drops directly pour.

5-2. Gas piping work

(1) CKD makes utmost effort to transport the valve to the users'site. Users are requested to check its appearance for any breakage or loosen bolt which might have occured during transportation.

(2) After removing the dust protective seals, clean inside of the valve flow channel and pipes. After confirming that there are no foreign matters like welding chip or scales, install the piping.

(3) For the valve piping, use a proper gasket and tighten with a flange bolt applying even torque onto it so that it is not unevenly fastened as shown in the fiqure at right.



(4) The valve posture shall be either a vertical mounting with its actuator set to upper side or a horizontal posture with its actuator set to its side. Roate actuater assembly (solenoid body) to required position.

6. Maintenance and inspection

6-1. Periodic inspection

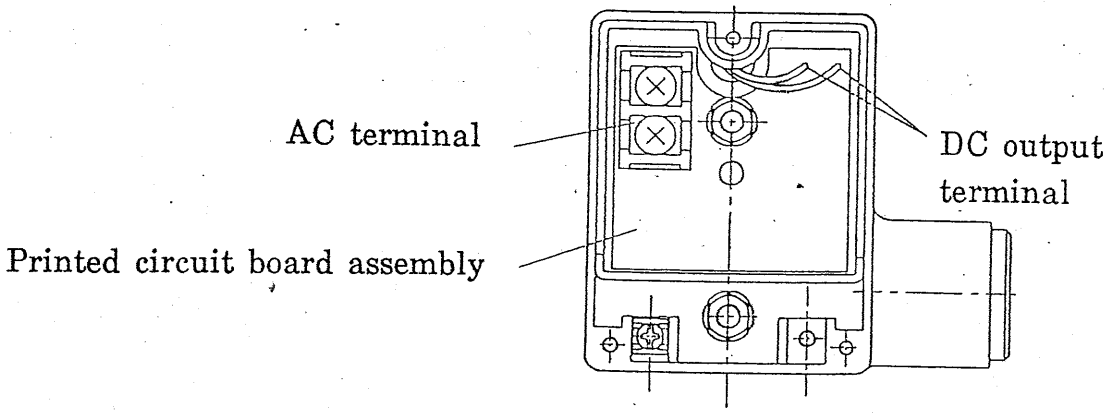
Perform periodic inspection in accordance with the periodic inspection procedure as described in the safety standards mentioned below :

"Guidance for the safe operation of gas boiler combustion equipment"
"Guidance for the safe operation of industrial gas combustion equipment"
(Issued by Japan Gas Association)

"Safety standard for gas absorbing water cooling and heating device"
(JRA - 4004)
"Safety standard for small gas sbsorbing water cooling and heating device"
(JRA - 4016)
"Guidance for the periodic maintenance for the gas absorbing water cooling equipment" (Issued by Japan Refrigeration and Air-conditioning Industries Association)

6-2. Troubleshooting

Trouble	Cause	How to check	Remedy
1. Doesn't open the valve	a. Malfunction of electric control circuit.	Measure the voltage with an AC terminal in printed circuit board assembly. [Fig - 2] Tolerable range of voltage AC 100V / AC 200V +10% to −10%	If measured voltage is not within the tolerable range, inspect and repair the circuit.
	b. Malfunction of printed circuit board assembly.	Measure the voltage with a DC output terminal in a rectifier in the printed circuit board assembly. [Fig - 2] Tolerable range of voltage AC 100V ----- about DC 90V AC 200V ----- about DC 180V +10% to −10% each	If measured voltage in not within the tolerable range, replace either the printed circuit board assembly or actuator assembly.
	c. Burnt out coil, layer shortcircuit.	Turn off the power. Measure the coil resistance with a DC output terminal in the printed circuit board assembly. AC 100V ----- 127Ω AC 200V ----- 466Ω +5% to −5% each	If measured value is not within the tolerable range, replace the actuator assembly. (The values at left are in 20 °C temperature condition)
	d. Excess gas pressure applied.	Check to see if the pressure is in excess of the max. operating pressure.	Inspect and repair the pressure regulator.
2. Doesn't close the valve	a. Malfunction of electric circuit.	Measure the voltage with an AC terminal in the printed circuit board assembly.	If voltage is applied, inspect and repair circuit.
	b. Foreign object adhering to valve disk.	Inform the service network of maker in your territory. (Never disassemble)	Replace whole part or have it repaired by service man.



Perspective view of terminal box

Trouble	Cause	How to check	Remedy
3. Secondary pressure is too high.	a. Pressure adjust spring is misadjusted.	· Check the spring No. written on the upper cap. · Remove the upper cap and check the pressure adjust spring.	Adjust the secondary pressure to the correct level.
	b. Diaphragm is damaged.	Inform the service network of maker in your territory. (Never disassemble)	Replace whole part or have it repaired by service man.
	c. Foreign object adhering to valve or orifice.	Inform the service network of maker in your territory. (Never disassemble)	Replace whole part or have it repaired by service man.
	d. Poor slide action of valve stem	Inform the service network of maker in your territory. (Never disassemble)	Replace whole part or have it repaired by service man.
4. Secondary pressure is too low.	a. Pressure adjust spring is misadjusted.	· Check the spring No. written on the upper cap. · Remove the upper cap and check the pressure adjust spring.	Adjust the secondary pressure to the correct level.
	b. Primary pressure is too low.	Remove the upper cap, press downward on the sub cap and check that the secondary pressure rises.	Make sure the designated primary pressure is maintained.
	c. Excessive flow rate.	Check the governor specs.	
5. Leakage	a. Leakage from pipe connection.	Check the leakage from the pipe connection.	Repair seal in the pipe connection.
	b. Breakage in valve disk and valve seat.	Inform the service network of maker in your territory. (Never disassemble)	Replace whole part or have it repaired by service man.
6. Low flow rate	a. Blinding filter.	Inform the service network of maker in your territory. (Never disassemble)	Replace whole part or have it repaired by service man.
7. It doesn't open slowly.	a. Oil leakage in damping unit.	Inform the service network of maker in your territory. (Never disassemble)	Replace whole part or have it repaired by service man.

6-3. Part replacement and inspection procedure

Replacement of printed circuit board assembly.

(1) Unscrew and remove the panhead screw and remove the cover for terminal box.
(2) Remove a hex nut and spring washer.
(3) Disassemble a coil lead wire from the printed circuit board assembly use the soldering iron.
(4) Remove the printed circuit board assembly.
(5) Solder the coil lead wire to a new printed circuit board assembly.
(6) Install the printed circuit board assembly.

Replacement of actuator assembly.

In case of VNM

(1) Remove a cap.
(2) Draw out the actuator assembly from the housing.
(3) Install a new actuator on the housing and tighten the cap.

In case of VLM, contact any service network of the maker in your territory. (Disassembling not possible)

Inspection

(1) Electrical test : By turning on or off a click sound is heard.
AC and DC voltage should be within the tolerable range.
(2) Open the main cock and apply pressure.
(3) Operation test : By turning on or off the switch, it should operate normally.
(4) Leakage test : there should be neither internal nor external leakage.

≪ Precaution ≫

Never disassemble the part other than actuator assembly (Printed circuit board assembly and solenoid body).
