Safety Precautions

Be sure to read this section before use.

When designing and manufacturing a device using CKD products, the manufacturer is obligated to check that device safety mechanism, pneumatic control circuit, or water control circuit and the system operated by electrical control that controls the devices is secured.
It is important to select, use, handle and maintain the product appropriately to ensure that the CKD product is used safely.
Observe warnings and precautions to ensure device safety.
Check that device safety is ensured, and manufacture a safe device.

WARNING

1 This product is designed and manufactured as a general industrial machine part.
It must be handled by an operator having sufficient knowledge and experience.

2 Use this product in accordance with specifications.

This product must be used within its stated specifications. In addition, never modify or additionally machine this product.
This product is intended for use in general industrial machinery equipment or parts. It is not intended for use outdoors (except for products with outdoor specifications) or for use under the following conditions or environments.
(Note that this product can be used when CKD is consulted prior to its usage and the customer consents to CKD product specifications. The customer should provide safety measures to avoid danger in the event of problems.)

❶ Use for applications requiring safety, including nuclear energy, railways, aircraft, marine vessels, vehicles, medical devices, devices or applications in contact with beverages or foodstuffs, amusement devices, emergency cutoff circuits, press machines, brake circuits, or safety devices or applications.
❷ Use for applications where life or assets could be significantly affected, and special safety measures are required.

3 Observe organization standards and regulations, etc., related to the safety of device design and control, etc.

ISO4414, JIS B 8370 (Pneumatics fluid power - General rules and safety requirements for systems and their components)
JFPS2008 (Principles for pneumatic cylinder selection and use)
Including the High Pressure Gas Safety Act, Industrial Safety and Health Act, other safety rules, organization standards and regulations, etc.

4 Do not handle, pipe, or remove devices before confirming safety.

❶ Inspect and service the machine and devices after confirming safety of all systems related to this product.
❷ Note that there may be hot or charged sections even after operation is stopped.
❸ When inspecting or servicing the device, turn OFF the energy source (air supply or water supply), and turn OFF power to the facility.Discharge any compressed air from the system, and pay attention to possible water leakage and leakage of electricity.
❹ When starting or restarting a machine or device that incorporates pneumatic components, make sure that the system safety, such as pop-out prevention measures, is secured.

5 Observe warnings and cautions in the following pages to prevent accidents.

■ The precautions are ranked as "DANGER", "WARNING" and "CAUTION" in this section.

DANGER: When a dangerous situation may occur if handling is mistaken leading to fatal or serious injuries, and when there is a high degree of emergency to a warning.

WARNING: If handled incorrectly, a dangerous situation may occur, resulting in death or serious injury.

CAUTION: When a dangerous situation may occur if handling is mistaken leading to minor injuries or physical damage.

Note that some items described as "CAUTION" may lead to serious results depending on the situation.
Every item provides important information and must be observed.

Warranty

1 Warranty period

The product specified herein is warranted for one (1) year from the date of delivery to the location specified by the customer.

2 Warranty coverage

If the product specified herein fails for reasons attributable to CKD within the warranty period specified above, CKD will promptly provide a replacement for the faulty product or a part thereof or repair the faulty product at one of CKD's facilities free of charge.
However, following failures are excluded from this warranty:

1) Failure caused by handling or use of the product under conditions and in environments not conforming to those stated in the catalog, the Specifications, or the Instruction Manual.
2) Failure caused by use of the product exceeding its durability (cycles, distance, time, etc.) or caused by consumable parts.
3) Failure not caused by the product.
4) Failure caused by use not intended for the product.
5) Failure caused by modifications/alterations or repairs not carried out by CKD.
6) Failure caused by reasons unforeseen at the level of technology available at the time of delivery.
7) Failure caused by acts of nature and disasters beyond control of CKD.

The warranty stated herein covers only the delivered product itself. Any loss or damage induced by failure of the delivered product is excluded from this warranty.
Note: For details on the durability and consumable parts, contact your nearest CKD sales office.

3 Compatibility check

The customer is responsible for confirming the compatibility of CKD products with the customer's systems, machines and equipment.

Safety precautions

Gas combustion systems: Warnings and Cautions

Be sure to read this section before use.

Gas combustion systems

When designing and manufacturing equipment using CKD products, the manufacturer is obligated to ensure that the safety of the mechanism, gas/pneumatic control circuit and/or water control circuit and the system that runs the electrical controls are secured.
It is important to select, use, handle and maintain CKD products appropriately to ensure their safe usage.
Observe warnings and precautions to ensure device safety.
Check that device safety is ensured, and manufacture a safe device.

WARNING

1. This product is designed and manufactured as a general gas combustion system control component.
   It must be handled by an operator having sufficient knowledge and experience.
2. Observe organization standards and regulations, etc., related to the safety of the device design and control, etc.
   JIS B 8415 (General safety code for industrial combustion furnaces)
   The Japan Gas Association (Technical Safety Guidelines for Industrial Gas Combustion Systems)
   Japan Boilers Association (Technical Safety Standards for Gas Boiler Combustion Systems)
   Including the High Pressure Gas Safety Act, Industrial Safety and Health Act, other safety rules, organization standards and regulations, etc.
3. Do not handle, pipe, or remove devices before confirming safety.
   ❶Inspect and service the machine and devices after confirming safety of the entire system related to this product.
   ❷Note that there may be hot or charged sections even after operation is stopped.
   ❸When inspecting or servicing the component, shut OFF the gas supply and power to the facility. Pay attention to possible leakage of electricity and leakage of electricity.

Design/Selection

1. Safety design

WARNING

■ Take measures to prevent physical harm or property damage in the event of failure of this product.

CAUTION

■ Vibration
Install this product in a place not subject to vibration.

2. Working fluid

WARNING

■ Working fluids
①Do not use any fluid other than the working fluids specified in the catalog.
②If used with compressed air or blown air, foreign matter, moisture, oil, etc., in the air will lead to operation faults or leaks.
③If used for fluids other than city gas or LPG, foreign matter, moisture, oil, corrosive elements, etc., in the fluid will lead to operation faults or leaks.
④Depending on the model, internal parts may wear when the valve operates. Caution is required because wear chips could enter the secondary side of the valve.

■ Fluid quality
Iron rust and debris in the fluid can cause operation faults or leaks and deteriorate product performance. Provide measures to remove foreign matter.

■ When using this product with LPG (propane gas or butane gas), depending on the gas quality, a viscous substance may be generated that can cause operation failure or deterioration of rubber sealing material thanks to its oil, which can further result in internal or external leakage. Conduct a periodic inspection at least once a year to ensure correct operation and that there are no leaks.

■ When used with hydrogen gas
- Do not feed gas within the combustion range.
- Purge the inside of the piping with inert gas such as nitrogen or argon before use.
- If flame flows back into the valve, the valving element, strainer, etc., could be damaged, and the product function could be damaged. Take measures to prevent backfire.
- Use hydrogen gas with grade 4 or more defined in JIS K 0512.
- If condensation adheres inside the valve, corrosion may damage the product's functions.
- When used in a molecular flow, hydrogen gas produces a flow rate approximately 3.8 times larger than that of air. Design the system with the premise that the gas is likely to leak, and take additional safety measures, such as a gas leakage detector, as necessary.

Design/Selection

3. Working environment

WARNING

■ Do not use this product near a heat generating source or in a location where it may be exposed to radiant heat.

■ Use this product within the specified ambient temperature range.

■ Take appropriate safeguards according to the degree of protection listed in the catalog specifications. Consult with CKD when using outdoors.

■ This product should not be used in any conditions where exposure to corrosive gas, solvents, water, or vapor may occur, or in any other atmospheric conditions that may deteriorate or damage the component materials. Ensure that the product is free of water droplets, oil, and metal chips.

■ Dust-proofing and drip-proofing
The performance of the dust- and drip-proof structure of this product is subject to change with working environments and aging, and therefore is not guaranteed. Install in a place where the product is not exposed to rain, water, direct sunlight, or dust.

■ This product cannot be used in an explosive atmosphere. This gas combustion system component does not have an explosion-proof structure, and cannot be used in an explosive atmosphere. Take special care to ensure that the working environment does not create a dangerous atmosphere.

Table 1 Explosive limit of flammable gas

Gas	Explosion limit (air) [vol%]	
	Lower limit	Upper limit
City gas (13A)	4.6	14.6
Propane	2.2	9.5
Butane	1.9	8.5
Hydrogen	4.0	75.0

4. Securing of space

CAUTION

■ Securing maintenance space
Secure sufficient space for maintenance and inspection.

Mounting, Installation and Adjustment

1. Installation

CAUTION

■ Be sure to read the instruction manual thoroughly before installing the product.

■ In the case of models with solenoid valves, do not apply external force to the coil during installation.

■ After installation, check for leaks from pipes, for proper wire connections and that the product is installed correctly.

■ While some shutoff valves are equipped with a simple filter or a strainer, always install a filter or strainer that enables element cleaning and replacement in front of the cutoff valve for the removal of foreign materials and foreign matter.

2. Piping

CAUTION

■ Observe the effective thread length for the piping threads. Chamfer the end of the thread section by approx. a half-pitch.

■ If excessive sealant (sealing tape, gel-type sealant) is applied when piping, it could enter the product and cause malfunctions.

■ When applying or wrapping sealant on the piping material, apply or wind it from the pipe end along the thread section, and leave 1.5 to 2 threads uncovered.

3. Wiring

WARNING

■ Ensure that the operation power supply for the safety shut-off valve is correctly connected.

● Example of faulty operation power supply connection

This is an informative actual case where an explosion occurred in the combustion system. The cause is the incorrect connection of the operation power supply as shown in Fig.1. (When the high potential side H and ground side G connections were reversed, the line between the monitoring relay and the shutoff valve happened to be grounded.) As a result, when the power is turned ON, the ground current flows to the safety shutoff valve, the valve opens, and a large amount of unburned gas flows out from the burner, which mixes with the pre-purge air to form an explosive mixture, which explodes at ignition.

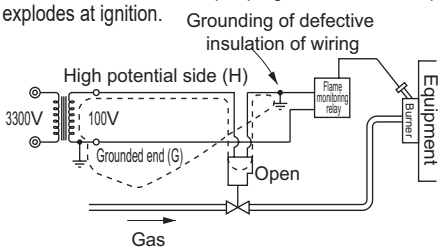


Fig.1 Example of faulty operation power supply connection

● Correct connection of operation power supply

Connecting the operation power supply's high potential side H and ground side G correctly as shown in Fig.2 can prevent ground current from flowing into the safety shut-off valve even when there is an insulation failure. This prevents the valve from opening, and therefore there is no risk of gas outflow.

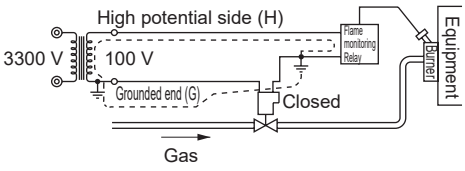


Fig.2 Correct connection of operation power supply

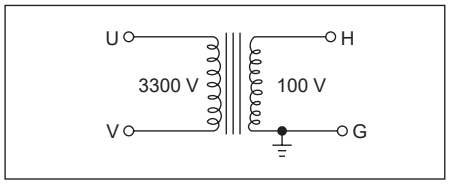
Excerpt from Volume 27 of the Journal of the Society of High Pressure Gas Industry

Gas combustion systems: Warnings and Cautions

Be sure to read this section before use.

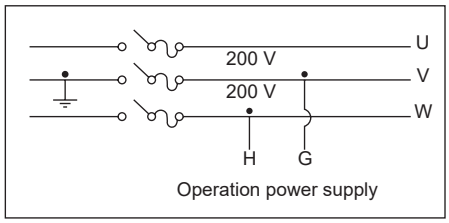
Mounting, Installation and Adjustment

● Single-phase 100 V

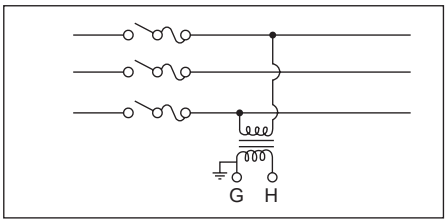


The secondary side of the transformer is always grounded on one side, and the high potential side (H) and ground side (G) are identified. In this case, correctly connect both the (H) and (G) sides.

● Three-phase 200 V



①When one of the three lines on the secondary side is grounded
To select this kind of three-phase power cable as the operation power supply, be sure to select the ground line (V), that is, (G) side, and either of the remaining lines as the (H) side.



②When none of the three lines on the secondary side are grounded
For the operation power supply, install a transformer dedicated for safety operation circuits and ground one side of the lines.

■ The wiring of the operation power supply is JIS B 9960-1 Safety of Machinery - Electrical Equipment of Machinery - Part 1: In accordance with general requirements, install an overcurrent protector (a circuit protector or a shutoff mechanism for wiring) for the operation power supply.

CAUTION

■ Use within the working pressure range.
The equipment may be damaged if a pressure that exceeds the proof pressure range is applied.

■ Provide a circuit breaker, such as a fuse, on the control circuit to protect electrical equipment.

■ Use of a switching circuit which does not generate contact chattering will increase the durability of the solenoid valves and motorized valves.

Use/Maintenance

1. Maintenance and inspection

WARNING

■ Conduct periodic inspections to check for any gas leakage from the safety shut-off valve.
Even a safety shut-off valve with the most powerful spring cannot close completely if there is any foreign matter left in the valve seat; such a condition can cause gas leaks into the furnace. Considering that such gas leaks do actually occur frequently, be sure to conduct periodic inspections.

● Periodic inspection
Close valve (1) and connect a rubber hose to the tip of test valve (3). Immerse the tip of the rubber hose in a container filled with water about 10 mm deep. Check for any bubbles when the test valve (3) is opened. If bubbles continue to occur, the safety shut-off valve has leaked. Please repair or replace it. For an accurate measurement of leakage, collect the gas in a measuring cylinder filled with water. (Refer to Fig. 3) (Follow the periodic inspection guide provided in the equipment's technical safety guidelines.)

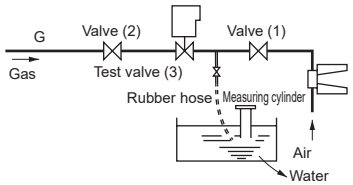


Fig. 3 Test method for the safety shut-off valve

CAUTION

■ Do not use valves as a footing or place any heavy objects on top of the valves.

■ If the product has been out of use for 1 month or more, perform a test run before starting the actual operation.

■ Read the instruction manual thoroughly before starting maintenance to ensure correct operation.

■ Always turn the power OFF and release any fluids or pressure before starting maintenance.

■ Pay attention to clogging of the strainer and filter.

2. Assembly/Disassembly

WARNING

■ Do not disassemble the inside of the valve.

Product-specific cautions

Design/Selection

WARNING

Solenoid valve

- Solenoid valves are not designed to function as a safety valve, such as an emergency residual pressure exhaust valve. When using in such a system, always take separate measures that will ensure safety.

Motorized valves and ball valves

- Motorized valves and ball valves are not designed to function as a safety valve, such as an emergency shut-off valve. When using in such a system, always take separate measures that will ensure safety.

VNA-R/RH

- The flow rate switching solenoid valve does not have a shutoff function.

CAUTION

Solenoid valve

- Make sure that the secondary pressure does not exceed the primary pressure of the solenoid valve.

Motorized valves and ball valves

- The inside of the actuator of a motorized valve or a ball valve is filled with operating fluid. The viscosity of this fluid changes with temperature, which means that the valve opening operation time is dependent on ambient temperature. The operating fluid is more viscous particularly in lower temperatures. Note that in lower temperatures, the valve opening operation time can be longer compared to that in normal temperatures.

Ball valves

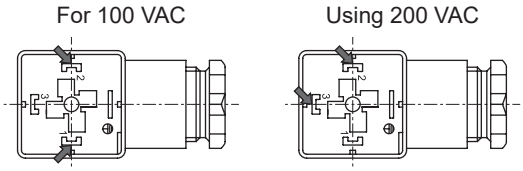
- Ball valve actuatorhas a built-in half wave rectifier circuit and cannot be used with an uninterruptible power supply (UPS).

Mounting, Installation, and Adjustment

CAUTION

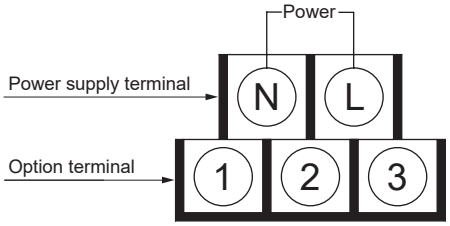
GHV

- When carrying this product, hold the body of the product.
- After connecting the pipes, always check for any leakage in all connected parts.
- Wire the power supply as follows by removing the terminal box. There is no polarity.



GRV

- Wire the power supply as follows by removing the terminal box lid. There is no polarity.
- Introduce pressure from secondary side piping to the secondary pressure inlet port. (Pressure reduction control type)



Use/Maintenance

WARNING

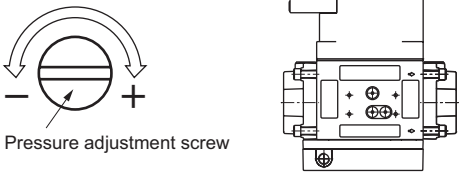
Solenoid valve

- Note that the surface of the solenoid valve can be hot thanks to the temperature increase in the coil. (Approx. 90°C) (Performance is not affected by higher surface temperatures.)
- There is a risk of electric shock due to touching the electric wiring connections (bare live parts). Always turn the power OFF before inspection. Never touch the live parts with wet hands.

CAUTION

GHV

- To adjust the pressure, loosen the governor cap to remove it, and turn the pressure adjustment screw using a flathead screwdriver. Install a pressure gauge on the secondary side and adjust the pressure while checking the actual pressure. A stopper is triggered when the upper or lower limit of the adjustable pressure range is reached, preventing further turning. Forcibly turning the screw can damage the adjustment screw, creating a risk of gas leakage.
  Pressure rises when the screw is turned clockwise and drops when the screw is turned counterclockwise.



GRV

- To adjust the pressure, loosen the governor cap to remove it, and turn the pressure adjustment screw using a flathead screwdriver. Install a pressure gauge and adjust the pressure while checking the actual pressure. A stopper is triggered when the upper limit of the adjustable pressure range is reached, preventing further turning. If forcibly rotated further, parts will be damaged, leading to malfunctions. Pressure rises when the screw is turned clockwise and drops when the screw is turned counterclockwise.