



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

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

 - 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.
 - Use for applications where life or assets could be significantly affected, and special safety measures are required.
- 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.
- Do not handle, pipe, or remove devices before confirming safety.
 - Inspect and service the machine and devices after confirming safety of all systems related to this product.
 - Note that there may be hot or charged sections even after operation is stopped.
 - 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.
 - 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.
- 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

- Warranty period**

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

 - 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.
 - Failure caused by use of the product exceeding its durability (cycles, distance, time, etc.) or caused by consumable parts.
 - Failure not caused by the product.
 - Failure caused by use not intended for the product.
 - Failure caused by modifications/alterations or repairs not carried out by CKD.
 - Failure caused by reasons unforeseen at the level of technology available at the time of delivery.
 - 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.
- Compatibility check**

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



Pneumatic Components

To use this product safely

be sure to read this before use.

General precautions for valves, "Directional control valve ① (No.RJ-011AA)".

Individual precautions : Plug-in valve TVG series

Design / Selection

1. Operating environment

CAUTION

Avoid using in places where water droplets, cutting oil, or dust directly fall on the valve. Note that even IP67 compatible products cannot be used underwater. For the built-in silencer type, ensure that water does not directly splash onto the exhaust port. IP65 and IP67 are the following standard test methods.

- IEC (International Electrotechnical Commission) standard (IEC60529:2001)
- JIS C 0920:2003

Explanation of IP65, IP67 protection characteristic symbols and test methods

IEC (International Electrotechnical Commission) standard

(IEC60529[IEC60529:2001])

IP - □ □

Protection characteristic code (International Protection)

First characteristic numeral (Protection class against solid foreign objects)

Class	Degree of protection	Second characteristic numeral (Protection class against water ingress)	Class	Degree of protection	Test method summary (using fresh water)
6	Dust-tight Dust does not enter the interior. 	5	Protection against water jets Water projected by a nozzle from any direction shall have no harmful effects. 	5	With test equipment shown below, test article (enclosure) surface area 1 m from all directions ² Per minute, extend Release for 3 minutes or more Submerge.
		7	Protection against immersion in water When the enclosure is temporarily immersed in water under specified pressure and time conditions, there shall be no ingress of water in quantities causing harmful effects. 		Immerse in 1 m of water for 30 minutes.

2. Serial transmission device station

CAUTION

- Communication abnormal state When this occurs, device unit enters following state.
 - Input signals all turn OFF.
 - Output signals all turn OFF. (However, if device unit has output mode setting switch, becomes set state.)

3. Surge killer

CAUTION

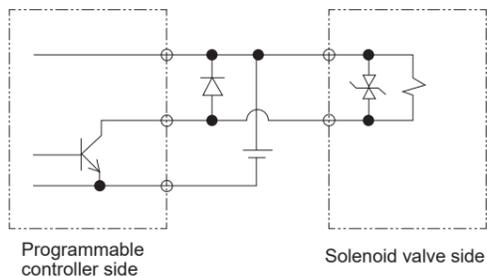
Surge suppressor attached to solenoid valve is for protecting output contacts for driving that solenoid valve. Cannot expect protection effect for other peripheral equipment, and may cause surge effects (damage, malfunction). Also, conversely may absorb surge generated by other equipment and cause damage such as burnout. Note following points.

① Surge suppressor limits solenoid valve surge voltage reaching several hundred volts to low voltage level that output contacts can withstand. Depending on your output circuit, this may be insufficient and may cause damage or malfunction. Judge usability in advance based on surge voltage limit level of solenoid valve used, voltage resistance and circuit configuration of output equipment, and return delay time. If necessary, implement additional surge countermeasures. Solenoid valve with surge suppressor can suppress reverse voltage surge generated at OFF to level in following table.

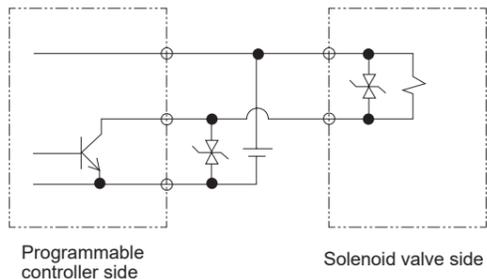
Specification voltage	Reverse voltage value when OFF
24 VDC	Approx. 47 V

② For NPN type output unit, surge voltage of table voltage + power supply voltage may apply to output transistor, so please install contact protection circuit.

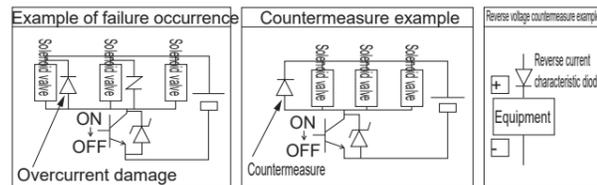
[Output transistor protection circuit Parallel installation example 1]



[Output transistor protection circuit Parallel installation example 2]



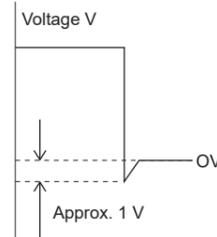
③ When other equipment or solenoid valves are connected in parallel to solenoid valve, reverse voltage surge generated at solenoid valve OFF applies to those equipment. Even for 24 VDC surge suppressor solenoid valve, depending on model surge voltage reaches several tens of volts negative, and this reverse polarity voltage may damage or malfunction other parallel connected equipment. Avoid parallel connection with equipment weak to reverse polarity voltage (e.g. LED indicator). Also, for parallel drive of multiple solenoid valves, surge from other solenoid valves flows into surge suppressor of one surge suppressor solenoid valve, and depending on current value may burn out that surge suppressor. Even for parallel drive of multiple surge suppressor solenoid valves, surge current concentrates on surge suppressor with lowest limit voltage, similarly may burn out. Even for solenoid valves with same model number, surge suppressor limit voltage varies, so in worst case leads to burnout. Avoid parallel drive of multiple solenoid valves.



④ Surge suppressor built into solenoid valve, when damaged by overvoltage or overcurrent from sources other than that solenoid valve, in many cases becomes short circuit state. Therefore, after damage large current flows at output ON, and in worst case may cause damage or fire to output circuit or solenoid valve. Do not continue energizing in failure state. Also, to prevent large current from continuing to flow, install overcurrent protection circuit in power supply or drive circuit, or use power supply with overcurrent protection.

4. Surge-less type

Surgeless type reduces solenoid valve surge voltage to approximately 1 V with built-in diode. No polarity.



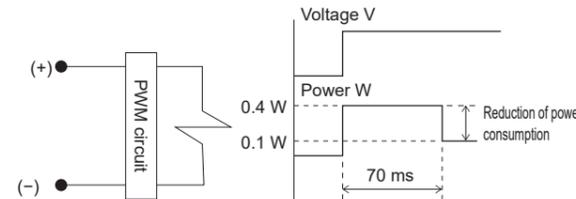
Surgeless type may damage built-in diode from switching surge of contact relay or switch. Implement switching surge countermeasures such as contactless relay or surge absorber.

5. Low heat generation/power saving circuit built-in type

Low heat generation/power saving type has built-in PWM circuit in solenoid valve with structure that reduces power during coil holding. Power consumption reduced to 1/4 of standard product.

[Low heat generation/power saving type specifications]

Item	Current A	Power consumption W	
At startup	24 VDC	0.017	0.4
At holding	24 VDC	0.008	0.1



CAUTION

Never use in environments where vibration or shock exceeds specification range. Leads to valve malfunction.

If instantaneous power outage of 30 ms or less occurs to solenoid valve drive power, energized state cannot be maintained. If disturbance causing instantaneous power outage of 30 ms or less occurs to solenoid valve supply power during continuous energization, perform energization OFF of 50 ms or more to turn solenoid valve ON again.

Do not use by gradually raising voltage. Valve will not operate.

Low heat generation/power saving circuit built-in type may damage built-in diode from switching surge of contact relay or switch. Implement switching surge countermeasures such as contactless relay or surge absorber.

6. AC voltage specifications

AC voltage specification has built-in full-wave rectifier circuit. When using SSR (solid state relay) for solenoid valve ON/OFF, depending on SSR type, solenoid valve return failure may occur. Recommend consulting relay or programmable controller manufacturer.

7. When used in combination with low friction cylinders

May cause malfunction from exhaust pressure. Please consult separately.

8. When used in vacuum

Select external pilot type. Supply 0.2 to 0.7 MPa compressed air to external pilot port (PA port) and connect negative pressure to supply port (P port) for use.

Use under low vacuum conditions.

9. When connecting vacuum generation equipment such as blower to exhaust port

Differential pressure between exhaust port and supply port is 0.7 MPaUse to keep below. Large differential pressure causes malfunction.

Use external pilot PA/PR separated type (KZ).

Do not connect PR port to vacuum generation equipment such as blowers.

10. About protection structure IP65, IP67

TVG series is standard compatible with IP65, IP67 and protected against dust and water, but cannot be used underwater. For environments with constant dust or water exposure, implement protective cover measures.

TVG Base piping
TVG Direct piping
TVG Base piping
TVG Base piping
TVG Direct piping
TVG-P4
Manifold specifications
Technical data
Safety precautions

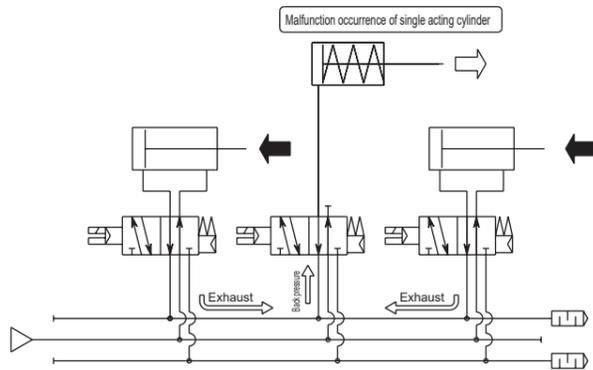
TVG Base piping
TVG Direct piping
TVG Base piping
TVG Direct piping
TVG-P4
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About exhaust malfunction prevention valve

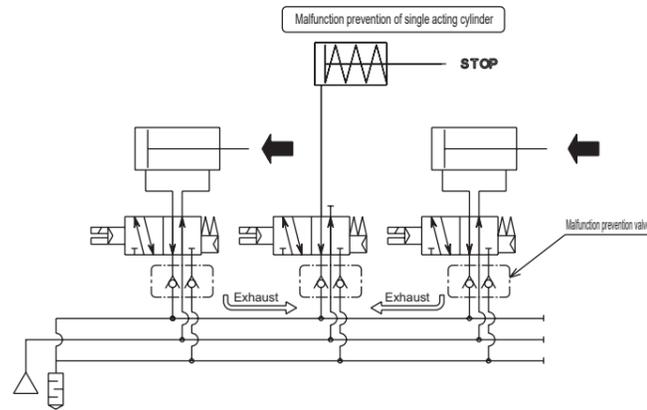
CAUTION : Malfunction prevention valve is a check valve. When cylinder rod is operated manually under no pressure, check valve operates and cylinder rod will not move. Malfunction prevention valve blocks back pressure from adjacent pneumatic equipment. Not designed to continuously seal and maintain pressure, so do not use for purposes other than back pressure blocking.

Generally, with manifolds, double-acting cylinders connected to single-acting cylinders or exhaust center valves may malfunction due to exhaust pressure wrap-around from other cylinder drive. TVG series manifold can select built-in "exhaust malfunction prevention valve" to prevent this malfunction, except for closed center valve and pressure center valve without exhaust pressure wrap-around. However, function may not be satisfied when using equipment affected by slight leakage or pressure such as low friction cylinders.

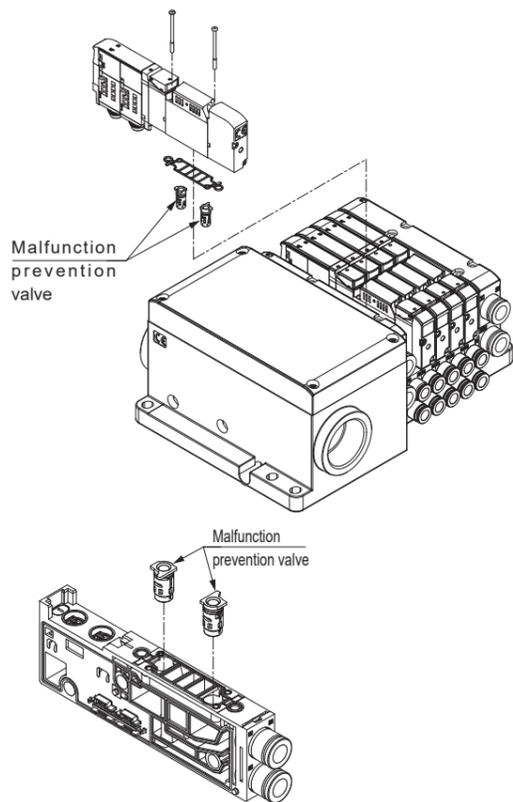
Example of pneumatic system that may malfunction



Pneumatic system by TVG Series



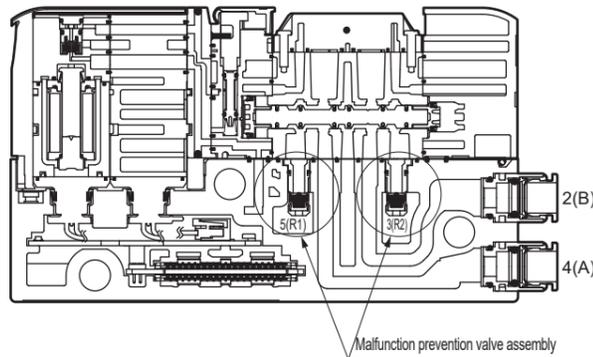
Internal structure diagram



Malfunction prevention valve equipped standard specifications

Model No.	Flow path switching	Option (H) selection
TVG*-1	2-position single	Yes
TVG*-2	2-position double	Yes
TVG*-3	3-position closed center	None
TVG*-4	3-position exhaust center	Yes
TVG*-5	3-position pressure center	None
TVG*-A	A valve side: Normally closed B valve side: Normally closed	Yes
TVG*-B	A valve side: Normally open B valve side: Normally open	Yes
TVG*-C	A valve side: Normally closed B valve side: Normally open	Yes

3-position closed center and pressure center do not require a malfunction prevention valve because they are not affected by exhaust pressure wraparound from other valves in the neutral position.



For precautions during installation, setup, adjustment, use, and maintenance, CKD equipment product site (<https://www.ckd.co.jp/kiki/en/>) → "Model No." → Instruction Manual.

Related products

Remote I/O RT Series

- Module type waterproof Remote I/O compatible with digital input/output, analog input/output, and IO-Link master.
- Device unit maximum control points: 512 bytes (4096 points).
- Maximum 18 connected units (including device unit).



Catalog No. CC-1557AA



IO-Link Wireless Input Unit WD Series

IO-Link Wireless compatible wireless input unit

- Error rate 1 in 1 billion, wired-level uninterrupted wireless IO-Link Wireless compatible
- 16-point digital input
- Achieves wireless ON/OFF switch wiring for cylinder switches etc.
- Lightweight, compact business card size easy to install on moving parts such as robot tip



Catalog No. CC-1629AA

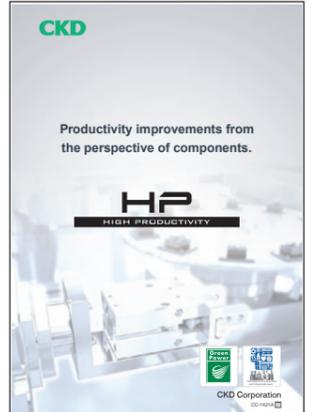


HP Series General

- Actuator for high-frequency use (HP1) Optimized sliding technology to extend life with same dimensions as conventional products (4 times or more compared to conventional)
- Actuator for dusty environment (G-HP1) Equipped with strong scraper and lube keeper to improve durability in dust environment (4 times or more compared to conventional)
- Actuator with length measurement function (HP2) Integrates high-precision position detection sensor to realize predictive maintenance
- Long-life cylinder Rechargeable battery compatible (P4-HP1) Further extends the life of P4 series with a track record in rechargeable battery manufacturing processes (Endurance: 10 million cycles)
- Environment-resistant cylinder For food manufacturing process (FP1-G-HP1) Long service life in dust environment of food manufacturing process (Endurance: 5 million cycles)



Catalog No. CC-1421AA



For details, refer to CKD Component Products Site (<https://www.ckd.co.jp/kiki/en/>) → "Model No.".