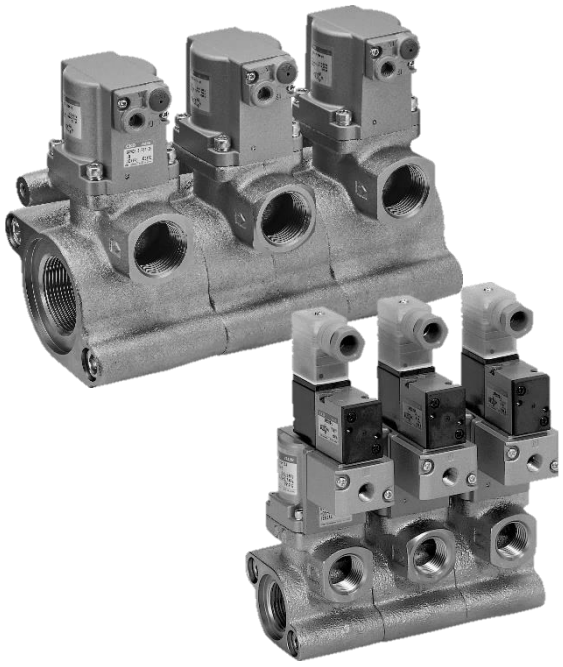
CKD

MODULE COOLANT VALVE

GCVE2 Series
GCVSE2 Series (Solenoid Valve Mounted)

INSTRUCTION MANUAL

SM-50704-A/2



- Read this Instruction Manual before using the product.
- Read the safety notes carefully.
- Keep this Instruction Manual in a safe and convenient place for future reference.

CKD Corporation

PREFACE

Thank you for purchasing CKD's **"GCVE2 Series/GCVSE2 Series" module coolant valve**.
This Instruction Manual contains basic matters such as installation and usage instructions in order to ensure optimal performance of the product. Please read this Instruction Manual thoroughly and use the product properly.
Keep this Instruction Manual in a safe place and be careful not to lose it.

Product specifications and appearances presented in this Instruction Manual are subject to change without notice.

- The product, which uses control valves such as solenoid valves, motor valves, and air operated valves, is intended for users who have basic knowledge about materials, fluids, piping, and electricity. CKD shall not be responsible for accidents caused by persons who selected or used the product without knowledge or sufficient training with respect to control valves.
- Since there are a wide variety of customer applications, it is impossible for CKD to be aware of all of them. Depending on the application or usage, the product may not be able to exercise its full performance or an accident may occur due to fluid, piping, or other conditions. It is the responsibility of the customer to check the product specifications and decide how the product shall be used in accordance with the application and usage.

SAFETY INFORMATION

When designing and manufacturing any device incorporating the product, the manufacturer has an obligation to ensure that the device is safe. To that end, make sure that the safety of the machine mechanism of the device, the pneumatic or water control circuit, and the electric system that controls such mechanism is ensured.

To ensure the safety of device design and control, observe organization standards, relevant laws and regulations, which include the following:

ISO 4414, JIS B 8370, JFPS 2008 (the latest edition of each standard), the High Pressure Gas Safety Act, the Industrial Safety and Health Act, other safety rules, organization standards, relevant laws and regulations

In order to use our products safely, it is important to select, use, handle, and maintain the products properly.
Observe the warnings and precautions described in this Instruction Manual to ensure device safety.

Although various safety measures have been adopted in the product, customer's improper handling may lead to an accident. To avoid this:

Thoroughly read and understand this Instruction Manual before using the product.

To explicitly indicate the severity and likelihood of a potential harm or damage, precautions are classified into three categories: "DANGER", "WARNING", and "CAUTION".

⚠ **DANGER**	Indicates an imminent hazard. Improper handling will cause death or serious injury to people.
⚠ **WARNING**	Indicates a potential hazard. Improper handling may cause death or serious injury to people.
⚠ **CAUTION**	Indicates a potential hazard. Improper handling may cause injury to people or damage to property.

Precautions classified as "CAUTION" may still lead to serious results depending on the situation.
All precautions are equally important and must be observed.

Other general precautions and tips on using the product are indicated by the following icon.

Indicates general precautions and tips on using the product.

Precautions on Product Use

⚠ WARNING

The product must be handled by a qualified person who has extensive knowledge and experience.

The product is designed and manufactured as a device or part for general industrial machinery.

Use the product within the specifications.

The product must not be used beyond its specifications. Also, the product must not be modified and additional work on the product must not be performed.

The product is intended for use in devices or parts for general industrial machinery. It is not intended for use outdoors or in the conditions or environment listed below.

- In applications for nuclear power, railroad system, aviation, ship, vehicle, medical equipment, and equipment that directly touches beverage or food.
- For special applications that require safety including amusement equipment, emergency shut-off circuit, press machine, brake circuit, and safety measures.
- For applications where life or properties may be adversely affected and special safety measures are required.

(Exception is made if the customer consults with CKD prior to use and understands the specifications of the product. However, even in that case, safety measures must be taken to avoid danger in case of a possible failure.)

Do not handle the product or remove pipes and devices until confirming safety.

- Inspect and service the machine and devices after confirming the safety of the entire system. Also, turn off the energy source (air supply or water supply) and power to the relevant facility. Release compressed air from the system and use extreme care to avoid water or electric leakage.
- Since there may be hot or live parts even after operation has stopped, use extreme care when handling the product or removing pipes and devices.
- When starting or restarting a machine or device that incorporates pneumatic components, make sure that a safety measure (such as a pop-out prevention mechanism) is in place and system safety is secured.

Precautions on Product Disposal

⚠ CAUTION

When disposing of the product, comply with laws pertaining to disposal and cleaning of wastes and have an industrial waste disposal company dispose of the product.

CONTENTS

1. PRODUCT OVERVIEW

1.1 Model Number Indication

● Air operated

GCVE2 2 - 2 - 15A - 05 - 0

● With solenoid valve

GCVSE2 2 - 5 - 20A - 10 - 0 2H S - 1

*1

Ⓐ Actuation *2

Ⓑ Module station No. *3

Ⓒ Port size (OUT port size) *4

Ⓓ Working pressure *5*6

Ⓔ Body/sealant combination

Ⓕ Coil *7*8

Ⓖ Other options *9 *10 *11

Ⓗ Voltage

		Model No.	
		GCVE2	GCVSE2
Ⓐ Actuation			
Blank	NC (normally closed)	●	●
2	NO (normally open)	●	●
Ⓑ Module station No.			
A	1-station Thread	●	●
B	1-station Through hole	●	●
2	2 stations	●	●
3	3 stations	●	●
4	4 stations	●	●
5	5 stations	●	●
Ⓒ Port size (OUT port size)			
15A	Rc1/2 (IN port: Rc3/4)	●	●
20A	Rc3/4 (IN port: Rc1)	●	●
L20A	Rc3/4 (IN port: Rc1 1/2)	●	●
25A	Rc1 (IN port: Rc1 1/2)	●	●
32A	Rc1 1/4 (IN port: Rc2)	●	●
40A	Rc1 1/2 (IN port: Rc2)	●	●
Ⓓ Working pressure			
05	0 to 0.5 MPa	●	●
10	0 to 1.0 MPa	●	●
16	0 to 1.6 MPa	●	●
Ⓔ Body/sealant combination			
		Body	Seal
O	Standard	Cast iron (plating)	Nitrile rubber	●	●
B	Option	Cast iron (plating)	Fluoro rubber	●	●
Ⓕ Coil			
2G	With DIN terminal box (Pg9)		●
2H	DIN terminal box with lamp (Pg9)		●
2J	With DIN terminal box (M12-4P connector)		●
2K	DIN terminal box with lamp (M12-4P connector)		●
Ⓖ Other options			
Blank	No option	●	●
S	With surge suppressor		●
B	With mounting plate	●	●
Ⓗ Voltage			
1	100 VAC (50/60 Hz) 110 VAC (60 Hz)		●
2	200 VAC (50/60 Hz) 220 VAC (60 Hz)		●
3	24 VDC		●

[Example of model No.]

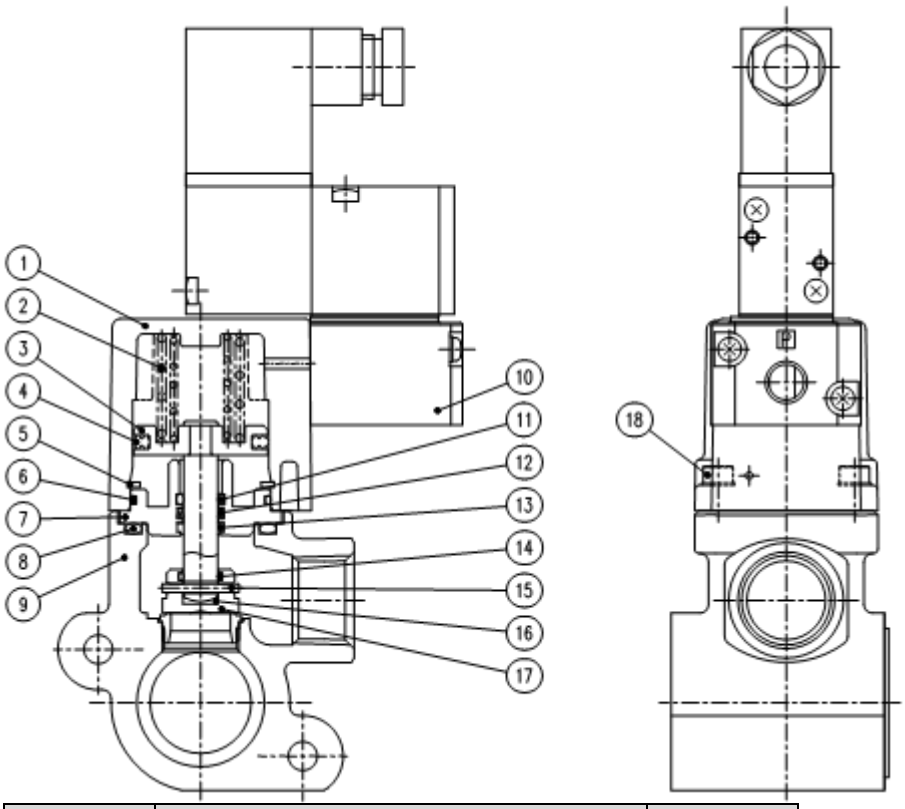
GCVSE22-5-20A-10-02HS-1

Model: GCVSE2 : With solenoid valve
Ⓐ Actuation : NO (normally open)
Ⓑ Module station No. : 5 stations
Ⓒ Port size : Rc3/4 (OUT port)
Ⓓ Working pressure : 0 to 1.0 MPa
Ⓔ Body/sealant combination : Body - cast iron (plating), sealant - nitrile rubber
Ⓕ Coil : DIN terminal box with lamp (Pg9)
Ⓖ Other options : With surge suppressor
Ⓗ Voltage : 100 VAC (50/60 Hz) , 110 VAC (60 Hz)

*1: Combining GCVE2 and GCVSE2 modules can be made to order. Contact CKD for details.
*2: Mixed modules with different actuation (Item Ⓐ) can be made to order. Contact CKD for details.
*3: The max. station No. is 5.
*4: Mixed modules with different port sizes (Item Ⓒ) can be made to order. Contact CKD for details.
*5: Combining modules with different working pressure (Item Ⓓ) is not possible due to the limits of the structure.
*6: 0 to 1.6 MPa (Item Ⓓ, 16) is not available for port size 32A or 40A.
*7: Surge suppressor is not available for coil 2J (Item Ⓕ).
*8: Coil 2K (Item Ⓕ) is available only for the type with surge suppressor and should be specified as 2KS.
*9: Surge suppressor of coil 2G (Item Ⓕ) is included externally. (2H is integrated.)
*10: The mounting plate (Item Ⓖ, B) is supplied and can be assembled to port size 15A or 20A only. Mounting plate is included.
*11: To add both the surge suppressor and mounting plate options, specify Item Ⓖ as SB.

1.2 Internal Structure

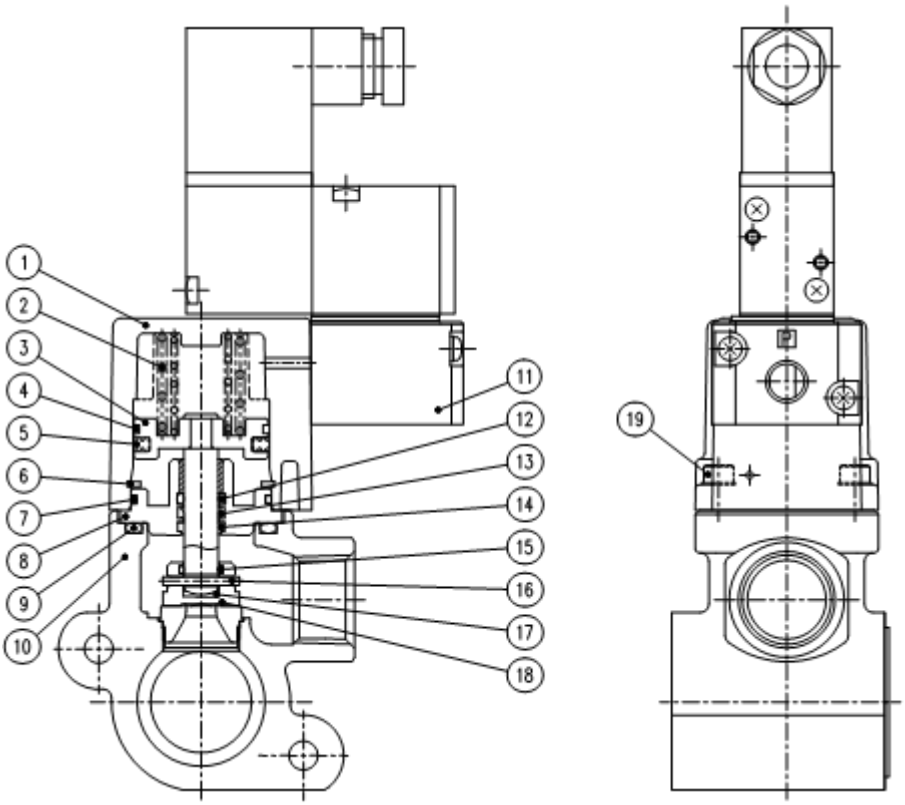
■ Internal structure for 0.5MPa, 1MPa



No.	Part name	Quantity
1	Cylinder cover	1
2	Spring	2
3	Piston assembly	1
4	PSD packing	1
5	C-type stop ring	1
6	O-ring	1
7	Adaptor	1
8	O-ring	1
9	Body	1
10	Pilot solenoid valve	1
11	O-ring	1
12	Rod packing	1
13	Scraper	1
14	O-ring	1
15	Roll pin	1
16	Thrust washer	1
17	Main valving element	1
18	Hexagon socket head cap screw	4

* The figure above shows GCVSE2(normally closed type). Normally open type has the spring below the piston.
* GCVE2 is not equipped with (13) pilot solenoid valve.

■ Internal structure for 1.6MPa



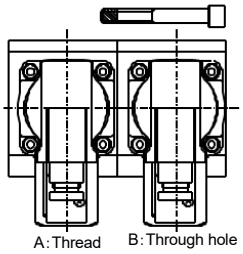
No.	Part name	Quantity
1	Cylinder cover	1
2	Spring	2
3	Piston assembly	1
4	Wearing	1
5	PSD packing	1
6	C-type stop ring	1
7	O-ring	1
8	Adaptor	1
9	O-ring	1
10	Body	1
11	Pilot solenoid valve	1
12	O-ring	1
13	Rod packing	1
14	Rod packing	1
15	Scraper	1
16	O-ring	1
17	Thrust washer	1
18	Main valving element	1
19	Hexagon socket head cap screw	4

* The figure above shows GCVSE2(normally closed type). Normally open type has the spring below the piston.
* GCVE2 is not equipped with (13) pilot solenoid valve.

1.3 Module configuration

●This product adopts the method to fix each module with the seal doing and the hex-head hole addition bolt in O-ring for connection.
The body shape is A：Thread type and B：Through hole type.
The composition of each number of each ream is shown below.

2連



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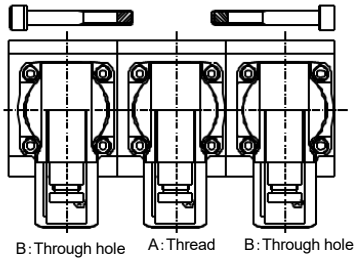

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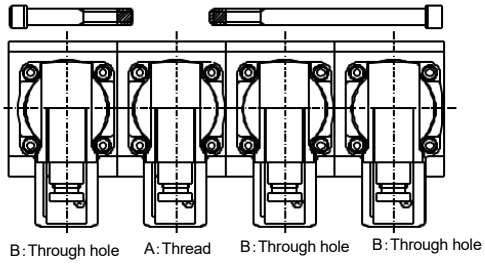

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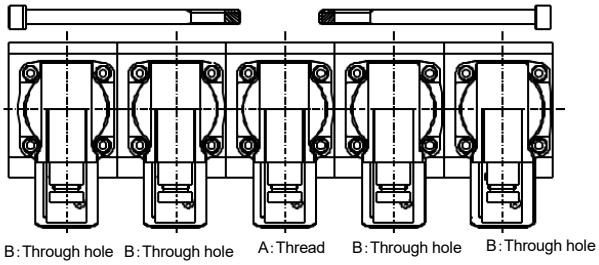


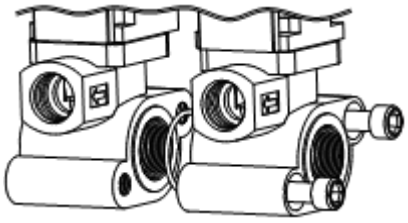
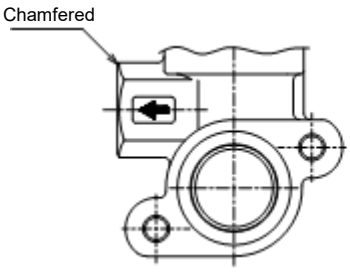


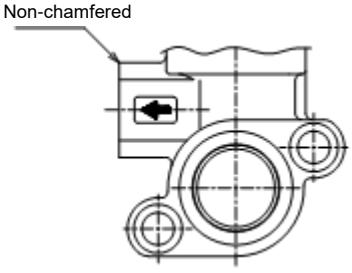
Diagram of connections

■ How to distinguish A type(Thread) and B type(Through hole)

The OUT port screw processing shape is different.



A：Thread



B：Through hole

2. INSTALLATION

2.1 Environment

⚠ WARNING

Consult CKD about the specifications before using the product outside the designated specifications or for special applications.

Prevent water and cutting oil from splashing onto the product directly.

- If water or cutting oil splashes onto the pilot solenoid valve directly, it may cause the coil to burn out.
- Although the product provided with a DIN terminal box has a degree of protection equivalent to IPX5, this does not guarantee a protection against continuous water splash. Protect the product by installing it under a cover or inside a paneled casing.
- When there is a possibility that the product is subjected to spatters of welding, take proper protective measures.

Consider measures for dissipating heat generated from a coil.

Appropriate ventilation or heat dissipation measures must be considered if the product is installed in a control board or if the solenoid coil needs to be energized for a long period.

Do not use the product in the presence of corrosive gas or solvents.

Do not use the product in an environment where corrosive gases such as sulfur dioxide gas or solvents are present.

Do not use the product in a humid environment.

Condensation may occur due to a change in the temperature.

Do not use an GCVSE2 Series valve in an explosive gas atmosphere.

The solenoid valve mounted type GCVSE2 Series valve cannot be used in an explosive gas atmosphere. For use in an explosive gas atmosphere, select an GCVSE2 Series valve and install an explosion-proof type solenoid valve in the pilot air circuit.

⚠ CAUTION

Take measures to prevent dusts from entering the valve.

In a dusty environment, install an elbow fitting facing down or a silencer to the pilot air exhaust port of the valve to prevent dusts from entering.

Use the product in an environment where it is not subject to radiant heat.

Do not paint the product or clean it with water or solvent.

The resin parts can become damaged and this may lead to a failure or malfunction.

- When using in a cold area, take proper measures against freezing.
- The product cannot be used outdoors. Protect the product by installing it inside a cover or a case.
- Do not use the product in an environment where the valve is subject to vibrations or inertia.

2.2 Unpacking

⚠ CAUTION

Do not remove the piping port protector and do not take the product out of the plastic bag until just before piping.
If the piping port protector is removed or the product is taken out of the plastic bag before ready to begin piping, foreign matters may enter from the piping ports and cause a failure or malfunction.

- Check that the model number ordered and the model number indicated on the product are the same.
- Check the exterior of the product for any damage.
- When storing the product, keep it packaged in the individual package box to prevent foreign matters from entering the valve. Take it out of the box when ready to begin piping.

2.3 Mounting

⚠ CAUTION

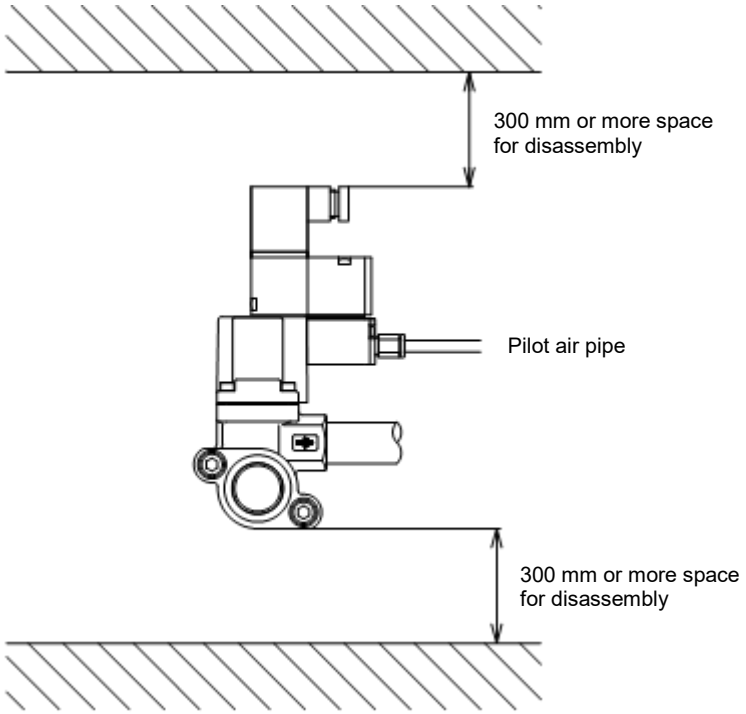
Thoroughly read and understand this Instruction Manual before mounting the product.

Hold the body firmly when handling and mounting the product.

Check for leakage from the pipes after mounting the product and confirm that the product has been mounted properly.

- There is no restriction on the mounting orientation.
- Secure sufficient space for working safely during maintenance and troubleshooting. (Refer to the figure below.)

1 Install piping by holding the width across flats section on the valve with a pipe wrench or an adjustable wrench.



2.4 Piping

⚠ CAUTION

Secure the product when tightening or piping again.

Secure and support the pipes to prevent the valve from being subjected to pipe loads and vibrations directly.

Do not apply high pressure suddenly when supplying fluid for the first time after connecting the pipes.

If the pipes are not secured properly, it may lead to accidents such as a pipe disconnection or a fluid leakage.

■ Pipe cleaning

Before piping, flush with air of more than 0.3 MPa to remove foreign matters such as dust, metal powder, rust, and seal tape.

■ Removal of foreign matters

Remove foreign matters such as dusts in the fluid to prevent causing an operation fault or leakage.
Install an approx. 80 to 100 mesh strainers in front of the valve.
And install a filter with 5μm mesh just in front of the valve, and on the pilot air circuit.

■ Fluid supply port when piping

Align the flow direction of the fluid with the arrow mark on the body when piping.
Pipe the body side supply ports and the pilot air side supply ports as indicated in the following table.

Supply ports for the body and the pilot air

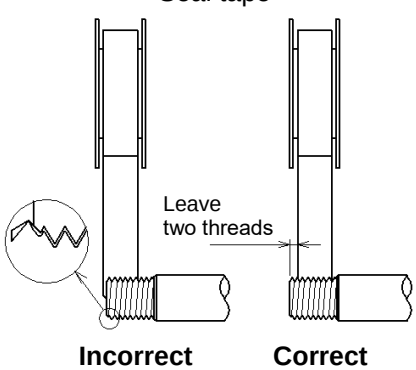
Model	Pilot air side Supply port
GCVE2 type	X
GCVE22 type	Y
GCVSE2 type GCVSE22 type	P

■ Seal material

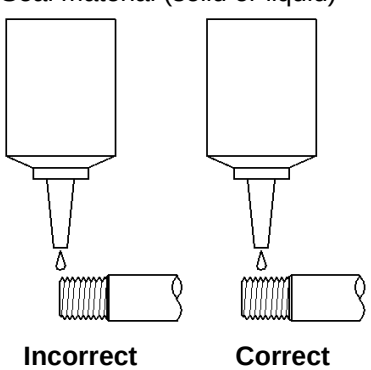
Apply a seal tape or seal material to the screw threads leaving two or more threads at the pipe end uncovered or uncoated. If the pipe end is fully covered or coated, a shred of seal tape or residue of seal material may enter inside of the valve and cause a failure.

When using a seal tape, wind it around the screw threads in the direction opposite from the screw threads and press it down with your fingers to attach it firmly.
When using a liquid seal material, be careful not to apply it to resin parts. The resin parts can become damaged and this may lead to a failure or malfunction.
Also, do not apply seal material to the internal threads.

Seal tape



Seal material (solid or liquid)



■ Tightening

- When piping to the valve, secure the body with a wrench or a vise.
- When using the solenoid valve mounted type GCVSE2 Series valve, do not connect a steel pipe directly to the pilot solenoid valve. The screws for mounting the solenoid valve may become damaged.
- For the pipe tightening torque, refer to the following tables.

Recommended tightening torque for pilot air port

Pipe port size	Recommended tightening torque (N·m)
Rc1/8	7 to 9

Recommended tightening torque for main port

Pipe port size	Recommended tightening torque (N·m)
Rc1/2	41 to 43
Rc3/4	62 to 65
Rc1	83 to 86
Rc1 1/4	97 to 100
Rc1 1/2	104 to 108
Rc2	132 to 136

■ Lubrication

This valve can also be used without lubrication. Although a lubricator is not required, when lubricating, use Class 1 ISO VG32 turbine oil (additive-free).
An operation fault may occur due to the loss of the initial lubricant if lubrication is not continued. Make sure to continue lubrication so as not to run out the lubricant.

■ Measures against drainage of pilot air

Compressed air contains a large amount of drainage such as water, oxidized oil, tar, and foreign matters. Such drainage may cause a significant reduction in the accuracy of the pneumatic component. Take measures against drainage (such as dehumidifying with an aftercooler or a dryer, removing foreign matters with an appropriate filter, or installing a tar removing filter) in order to improve the quality of air.

■ Prevention of entry of dusts

In a dusty environment, install a silencer or a filter to the exhaust port and the breathing hole of pilot air to prevent dusts from entering and causing an operation fault and fluid leakage.

2.5 Wiring

This section applies to solenoid valve mounted type GCVSE2 Series only.

⚠ WARNING

Thoroughly read and understand this Instruction Manual before working on electrical wiring.
The product must be handled by a person who understands the structure and operation principle of solenoid valve and has knowledge to secure the safety.

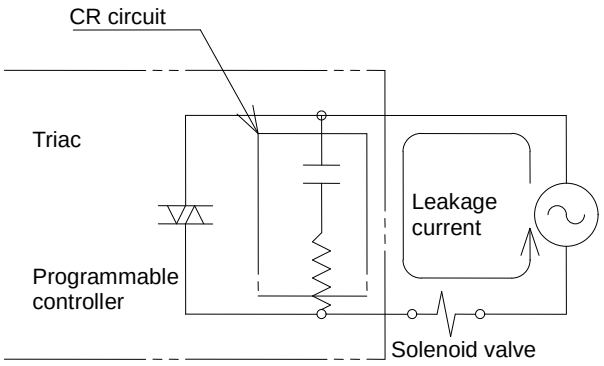
⚠ CAUTION

Check the power supply voltage and the current type (AC or DC).

Check for leakage currents from external control devices to prevent a malfunction.

- When using a control device such as a programmable controller, leakage currents from the control device may affect the solenoid valve and cause it to malfunction.
- When using the product, make sure that leakage currents from external control devices satisfy the condition shown in the following table.

Rated voltage	Leakage current
100 VAC	1.5 mA or less
200 VAC	3.0 mA or less
24 VDC	1.8 mA or less



Protection of electric facilities
In order to protect electric facilities, use a circuit breaker such as a fuse in the control circuit.

Polarity of the solenoid valve
The valve does not have positive and negative terminals although it is designed for use with a direct current.

Continuous power supply
When the solenoid valve is installed on a control panel or energized for an extended period, it will be heated to a temperature of 40 to 60℃. In this case, a provision is required to discharge heat, i.e. ventilation.

Surge in the electric circuit
In case your electric circuits hesitate the surge of solenoid, it is recommended to use our surge killer provided valve or put a surge-absorber in parallel to the solenoid.

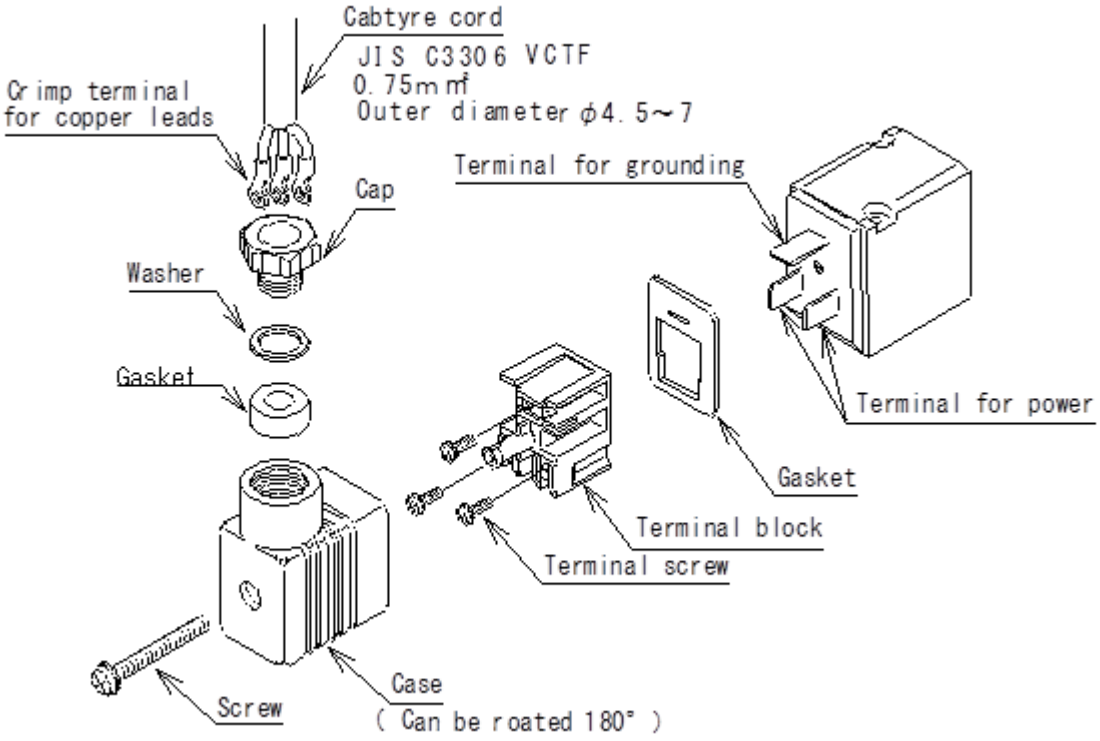
2.5.1 How to wire the DIN terminal box

Use a cabtyre cord with an outside diameter of ø4.5 to ø7 and a nominal cross-sectional area of 0.75 mm^2 or more.

1. Strip the lead wire of the cabtyre cord.
2. Insert the cabtyre cord into the cap, washer, gasket and case.
3. Insert the crimp terminals for copper wires into the lead wire of the cabtyre cord and crimp the terminals.
4. Put the crimp terminals for the lead wire on the terminal block and secure the crimp terminals with a screw with a tightening torque of 0.5 N·m.
   Connect the ground wire to the earth terminal for the terminal block.
5. Insert the gasket and the terminal block into the coil assembly.
6. Put the case on the terminal block and secure a screw with a tightening torque of 0.5 N·m.
   When changing the outlet direction of the cord, take the terminal block out of the case, turn it by 180° and put it into the case.
7. Tighten the cap to the case and secure the cord.

■ **DIN terminal box (Pg9)**

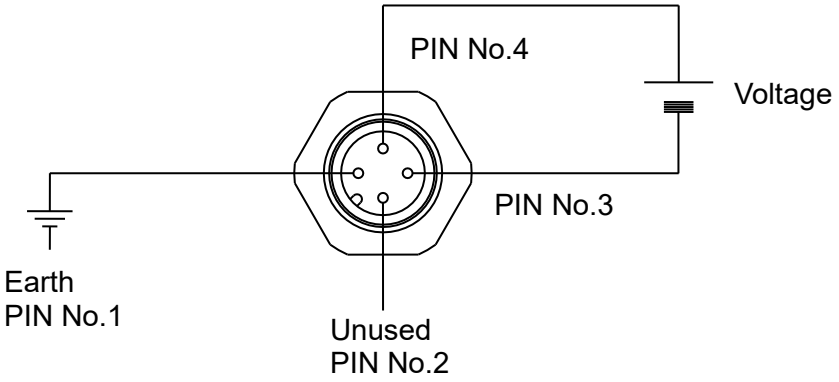
DIN terminal box with lamp(Pg9)



Wiring of DIN terminal box

■ **DIN terminal box（M12-4P Connector）**

DIN terminal box with lamp（M12-4P Connector）



M12-4P connector pin arrangement

3. USAGE

⚠ WARNING

Do not use the product as a valve for ensuring safety such as an emergency shut-off valve.
The product is not designed to be used as a valve for ensuring safety such as an emergency shut-off valve. If using the product for such a system, take appropriate measures in advance to secure safety.

Take necessary measures for preventing people and properties from being affected by a failure of the product.

Do not use fluids other than those specified in the Specifications.
Check the compatibility with the working fluid by referring to the checklist of control fluids in the catalog.
If the quality of the working fluid is poor, for example, if it contains fine particles, sludge, and foreign matters, the durability of the rod packing will decrease significantly. If the sealing performance of the rod packing is lost, the fluid may leak into the cylinder, flow backward through the pilot air piping, and damage the device in the air circuit. Perform maintenance periodically or take proper measures.

Do not touch the coil and the actuator while the product is energized.
A burn injury may occur.

Do not touch electrical wiring connections (bare live parts) while the product is energized.
An electric shock may occur.

⚠ CAUTION

Use the product within the specified pressure range.

3.1 Checks to Make Before Use (Checks Made After Mounting)

⚠ WARNING

Close the main cock and discharge the fluid in the valve before performing an appearance check.

Turn off the power before checking the power and insulation resistance.
Be careful not to get an electric shock while checking.

■ Appearance check

- Check that the valve is securely fixed to the piping by pressing it by hand.
- Check that the threaded parts such as bolts, nuts, and screws are not loose.

■ Leakage check

- Pressurize the pilot air to check for leakage from the piping connection.
- Pressurize the fluid to check for leakage from the piping connection.
- It is recommended to check for leakage by supplying compressed air (0.3 MPa to 0.5 MPa) and applying soapy water to see if bubbles form.

■ Electricity check

- Check the power supply voltage.
  Keep the voltage fluctuations within ± 10% of the rated voltage range.
  If the product is used beyond the voltage fluctuation range, an operation fault or damage to the coil may occur.

- Check the insulation resistance.
  Measure the insulation resistance between a non-live metal part mounted to the solenoid valve and a bare live part such as a lead wire.
  Check that the insulation resistance is 100 MΩ or more with 500 VDC megger.

■ Operation check

- Apply the rated voltage and pressurize the working fluid to check if the solenoid valve performs opening and closing movement properly.
  When the energization time for the pilot solenoid valve is short, the cylinder valve may not be able to follow and operate.
  Check the operation frequency described in "3.2 Safety Instructions."

■ When changing a line voltage

- The DC voltage is changed from the AC voltage,and changing everything from the DC voltage to The AC voltage moreover recommends the exchange of the electromagnetic valve (3PB2 series) for the operation.

3.2 Safety Instructions

- Do not hold the solenoid valve when carrying the product.
  Do not carry the product by holding the cables connected to the terminal box.
- Do not stand or put a heavy object on the solenoid valve.
- When the product has not been used for three days or more, the initial response time may be delayed for about a second. Perform a trial run before starting operation.
- Set the pilot pressure so that it is within the specified range.
- Observe the operation frequency. For information on the operation frequency, refer to the following table.

Operation frequency

Port size	Operation frequency	
	For 0.5, 1.0MPa	For 1.6MPa
15A	30 times/min or less	30 times/min or less
20A	30 times/min or less	30 times/min or less
L20A/25A	30 times/min or less	30 times/min or less
32A/40A	20 times/min or less	

- When the energization time for the pilot solenoid valve is short, the valve may not be able to follow and operate.
- In order to muffle the exhaust sound from the pilot solenoid valve of an GCVSE2 Series valve, install a silencer (port size: M5) to the exhaust port of the pilot solenoid valve.
- Some materials cannot be used because they could corrode, such as sealing materials, depending on the type of coolant.
- Use an FKM seal for chlorine-based coolant.
- If there are any unclear points, contact CKD or your dealer.
- When an abnormality is found, refer to "5 TROUBLESHOOTING".

3.3 Manual Operation

⚠ CAUTION

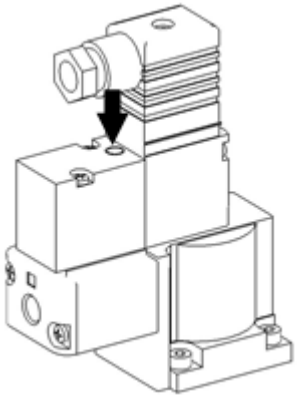
Make sure that the manual shaft has returned to the original position after performing manual operation.

<Manual operation method for the non-locking type (GCVSE2)>

1 Supply an air pressure that is within the specified range to the pilot port.

2 Push the manual shaft until it stops.
While the manual shaft is pushed, the valve is in the same state as being energized and operated.
The valve returns to the original position by releasing the manual shaft.

3 Check that the manual shaft has returned to the original position.



The valve operates while pushing the manual shaft.

4. MAINTENANCE AND INSPECTION

⚠ WARNING

Thoroughly read and understand this Instruction Manual before maintenance and inspection.

4.1 Maintenance Parts

■ Pilot solenoid valve

Replace the pilot solenoid valve when an abnormality such as an electric failure, leakage, and delay in the operation is found.
Replace the pilot solenoid valve when the operation count reaches approximately 5 million times.

■ Packing, O-ring, main valve body

Replace the packing, O-ring, and main valve body when an abnormality such as leakage, sticking of the valve, and delay in the operation is found while using the product.
Replace the whole product when the operation count of the valve reaches the value shown in the following table.

Valve operation count

Port size	Operation count	
	For 0.5, 1.0MPa	For 1.6MPa
15A to 25A	Approx. 3 million times	Approx. 2 million times
32A、40A	Approx. 2 million times	

4.2 Periodic Inspection

- In order to use the product under optimum conditions, perform a periodic inspection every six months.
- For details on inspection, refer to "3.1 Checks to Make Before Use (Checks Made After Mounting)" in this Instruction Manual.
- Be careful not to clog the strainer and filter.

4.3 Disassembling and Assembling

⚠ WARNING

Close the main cock and discharge the fluid in the valve before disassembling.

Turn off the power before disassembling and assembling.
An electric shock may occur.

Be careful not to let the springs pop out when disassembling.
An injury may occur.

- A spring is contained in the cylinder cover. Refer to "1.2 Internal Structure".
- For the normally closed type (GCVE2, GCVSE2), a C-type stop ring is used to prevent the spring from popping out. Do not remove the C-type stop ring.
- For the normally open type (GCVE22, GCVSE22), a built-in spring has below the piston. Be careful of reaction force when disassembling.

Faults caused by disassembly or replacement of the product or parts are not covered by the warranty.

4.3.1 Disassembling

1. Remove four hexagon socket head bolts securing the cylinder cover assembly.
2. Lift up the cylinder cover and remove it together with the piston assembly.
3. Remove the roll pin fixing the main valving element from the hole. Be careful when removing the roll pins, as they are easily broken or bent.
4. Remove the adapter from the piston rod and remove it.

4.3.2 Assembling

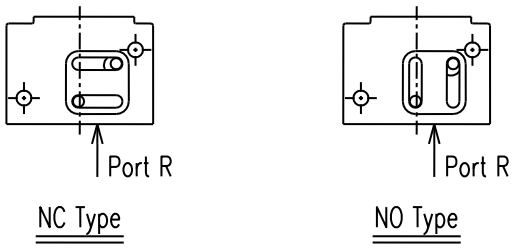
1. Apply grease to the packing and the O-ring.
2. Also apply grease to the surfaces on which the packing slides, such as the inside surface of the cylinder cover and the piston rod.
   Silicon grease is recommended.
3. Attach the packing in correct orientation.
4. Align the holes of the main valving element and piston rod and press-fit the roll pin.
5. Fix the adapter to the body.
6. Assemble all parts.
   Tighten the threaded parts with the tightening torque shown in the following tables.

Recommended tightening torque for hexagon socket head bolt for tightening the body

Port size	Screw size	Recommended tightening torque (N·m)
15A	M4	3 to 4
20A	M5	6 to 8
L20A, 25A	M6	10 to14
32A, 40A	M8	26 to 33

■ **When mounting a pilot solenoid valve**

1 Mount the solenoid valve after confirming the direction of the gasket between the pilot solenoid valve and the cylinder cover.
Since the direction of the gasket is different between the normally closed type (NC) and the normally open type (NO), be careful when mounting the gasket.



Mounting direction of the pilot solenoid valve gasket

2 Tighten the cross recessed pan head screw with the tightening torque of 0.46 N·m to 0.75 N·m and secure the pilot solenoid valve to the cylinder cover.

5. TROUBLESHOOTING

5.1 Problems, Causes, and Solutions

If the product does not operate as intended, check the table below for a possible solution.

Problem	Cause	Solution
Valve does not operate.	Valve is not energized.	Check the wiring, fuse, etc. and turn on the power.
	Applied voltage is lower than voltage fluctuation range.	Check the power and input the rated voltage.
	Fluid pressure is too high.	Adjust it so that it is within the specified range.
	Pilot pressure is too low.	Adjust it so that it is within the specified range.
	Pilot solenoid valve does not operate.	Replace the pilot solenoid valve.
	Foreign matters are stuck in piston rod.	Disassemble the valve and clean its inside.
Valve does not return.	High fluid pressure	Adjust within the fluid pressure range
	Power is not turned off.	Check for leakage current and correct the circuit to make sure that the power turns off properly.
	Pilot solenoid valve does not return.	Replace the pilot solenoid valve.
	Foreign matters are stuck in piston rod.	Disassemble the valve and clean its inside.
	Grease on packing has run out.	Disassemble the valve, clean its inside and apply grease to it.
There is external leakage.	There are abrasions and scratches on packing and O-ring.	Disassemble the valve to replace the packing and the O-ring.
	Screws and bolts are loose.	Tighten the screws and the bolts.
There is internal leakage.	There are abrasions and scratches on valve seat of body.	Replace the product.
	There are abrasions and scratches on sealing surface of main valve body.	Replace the main valve body.
	Foreign matters are stuck in main valve body.	Disassemble the valve and clean its inside.

If you have any other questions or concerns, contact your nearest CKD sales office or distributor.

6. WARRANTY PROVISIONS

6.1 Warranty Conditions

■ Warranty coverage

If the product specified herein fails for reasons attributable to CKD within the warranty period specified below, 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 this Instruction Manual.
- Failure caused by incorrect use such as careless handling or improper management.
- 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 that could have been avoided if the customer's machinery or device, into which the product is incorporated, had functions and structures generally provided in the industry.
- 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.

■ Confirmation of product compatibility

It is the responsibility of the customer to confirm compatibility of the product with any system, machinery, or device used by the customer.

■ Others

The terms and conditions of this warranty stipulate basic matters.
When the terms and conditions of the warranty described in individual specification drawings or the Specifications are different from those of this warranty, the specification drawings or the Specifications shall have a higher priority.

6.2 Warranty Period

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