CKD

Manual air pressure switching valve

HMVE series
HSVE series

INSTRUCTION MANUAL

SM-A91108-A

- 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 **manual switching 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.

- This product is intended for use by people who have a basic knowledge of materials, fluids, piping and electricity regarding the use of control valves (solenoid valve, electric valve, air operated valve, etc.). CKD shall not be responsible for any accidents caused by selection or use of the product by persons without knowledge or adequate training on control valves.
- Since the purpose of use varies widely depending on the customer, it is impossible for CKD to grasp all of the purposes. Depending on the purpose and usage, or depending on conditions of fluid, piping, etc., the intended performance may not be delivered or accidents may occur. It is the customer's responsibility to check the specifications of the product and determine the usage according to the intended purpose 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 is ensured for the machine mechanism of the device, the air pressure control circuit or the water control circuit, and the electric system that controls them.

Ensure to observe organization's standards, laws and regulations etc. for safety related to design and management of the equipment.

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

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 prevent accidents,

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 the person who has sufficient knowledge and experience.

This product is designed and manufactured as equipment and parts for general industrial machinery.

Use the product within the specifications.

It cannot be used outside of product-specific specifications. Never modify or additionally process the product.

Since this product is intended for use as equipment and parts for general industrial machinery, it is not intended for use outdoors or in the following conditions and environments.

(It can be used under such conditions and environments if you consult CKD at the time of its introduction and understand the specifications of the product. However, even in such a case, take safety measures to avoid danger in case of failure.)

- Use in equipment and applications that come into direct contact with nuclear power, railways, aviation, ships, vehicles, medical equipment, beverages and food.
- Use in applications requiring safety, such as recreational equipment, emergency shut off circuits, press machines, brake circuits, and safety measures.
- Use in applications that are expected to have a significant impact on people and property and require special safety.

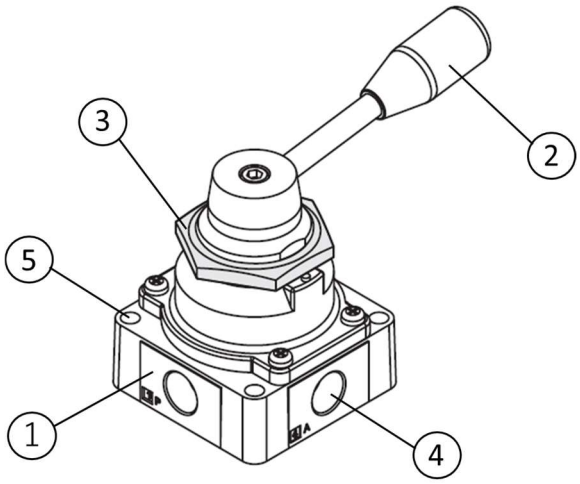
Never handle the product or remove the piping or equipment until safety is confirmed.

- Check and maintain the machinery and equipment only after confirming that all systems related to the product are safe. In addition, turn OFF the energy source such as supply air and supply water, as well as the power supply to the applicable equipment, release the compressed air from the system and check for water leakage and electrical leakage.
- Even when the operation is stopped, there may be hot parts or live parts. Handle the product and remove the piping and equipment carefully.
- Before starting or restarting machines or devices that use pneumatic equipment, make sure that the safety of the system is ensured by the jumping prevention or other measures.

CONTENTS

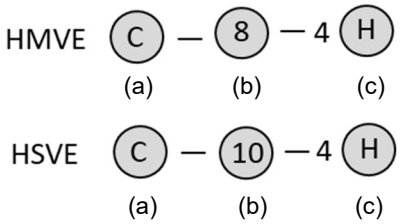
1. PRODUCT OVERVIEW

1.1 Part Name



No.	Name	Explanation
1	Valve body	A valve is built in to switch flow channels.
2	Handle	Used to switch the valve. The handle is attached to the product at the time of delivery.
3	Panel mounting nut	Used when mounting to the panel. Not attached to the product. To be purchased by the customer.
4	Piping ports	1 (P) indicates the supply port, 3 (R) indicates the release port and 2 (B)/4 (A) indicate the output ports.
5	Mounting holes	Used for direct mounting.

1.2 Model Number Indication



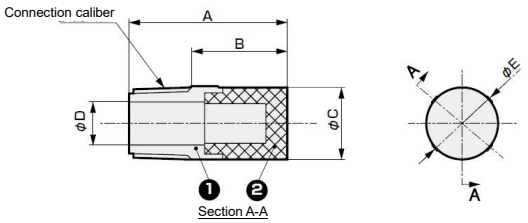
(a) Switching position category		(b) Connection caliber		(c) Piping	
C	3-position all port block	8	Rc1/4	H	Transverse piping
O	3-position ABR connection	10	Rc3/8	V	Back piping
		15	Rc1/2		
		20	Rc3/4		

Refer to the catalog for cautions on model number selection.

Related equipment

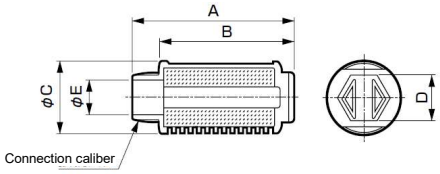
■ Silencer

<SLW-6S, 8S>



Model number	Connection caliber	A	B	C	D	E
SLW-8S	R1/4	28	19	14.8	9	15.4

<SLW-6A, 8A, 10A, 10L>



Note 1: Select the silencer after checking its dimensions.
Note 2: For M4GA2 DIN rail mount type, use SLW-8S. SLW-8A will cause interference.

Model number	Silencing effect dB(A)	Effective cross-sectional area mm^2	A	B	C	D	E	Connection caliber
SLW-8A	30 or more	20	44.5	36	20	13	8.5	R1/4
SLW-10A	30 or more	30	58.5	48.5	25.5	17	12	R3/8
SLW-10L	30 or more	60	68.2	58.4	28	19	12	R3/8
SLW-15A	30 or more	75	71.4	58.4	28	19	15	R1/2

■ Thread plug

<4G□R-□P>

Model number	Adaptive caliber
4G3R-08P	Rc1/4
4G3R-10P	Rc3/8
4G4-15P	Rc1/2

Refer to the catalog for cautions on model number selection.

1.3 Specifications

1.3.1 Common specifications

Model number		HMVE, HSVE
Valve type and operation method		Slide valve
Fluid used		Compressed air
Maximum working pressure	**MPa**	1.0
Minimum working pressure	**MPa**	0.05
Pressure resistance	**MPa**	1.5
Ambient temperature	**ºC**	-5 to 50 (no freezing)
Fluid temperature	**ºC**	5 to 50
Lubrication	**Note 1**	Not needed
Protective structure	**Note 2**	Dustproof
Vibration resistance	**m/s^2**	50 or less
Impact resistance	**m/s^2**	300 or less
Atmosphere		Use in corrosive gas atmosphere not allowed

Note 1: For lubrication, use turbine oil Class 1 ISO VG32.
Excessive or intermittent lubrication will cause unstable operation.
Note 2: The protective structure is dustproof. Not drip-proof. Do not subject the product with water droplets or oil during use.

1.3.2 Flow characteristic

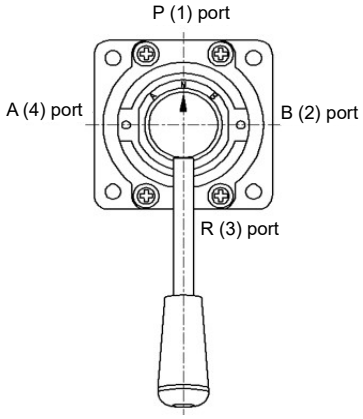
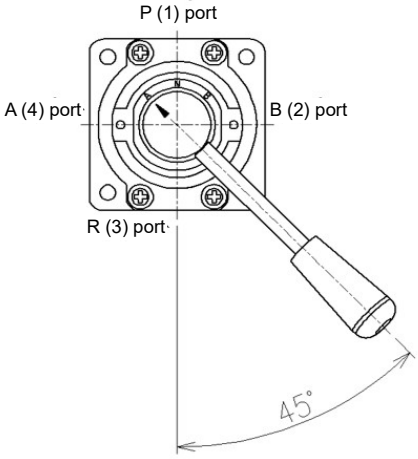
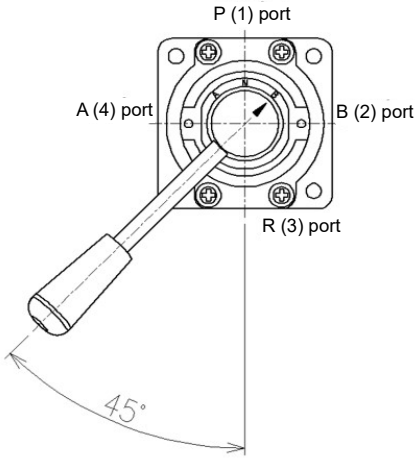
Model	Connection caliber	Flow characteristic [$dm^3/(s \cdot bar)$]
HMVE	1/4	1.4
HSVE	3/8	11.8
	1/2	12.8
	3/4	14.2

1.3.3 Weight

Model	Weight [g]
HMVE	
HSVE	

1.4 Internal Structure

■ Description of manual switching valve operation

	Operation diagram (example of the HMVE series)	Description of operation
Manual operation OFF		In case of HMVEC, HSVEC 1 (P), 4 (A), 2 (B), 3 (R) are closed In case of HMVEO, HSVEO 1 (P) is closed 4 (A), 2 (B) -> 3 (R)
Manual operation A-ON		In case of HMVEC, HSVEC 1 (P) -> 4 (A) 2 (B) -> 3 (R) In case of HMVEO, HSVEO 1 (P) -> 4 (A) 2 (B) -> 3 (R)
Manual operation B-ON		In case of HMVEC, HSVEC 1 (P) -> 2 (B) 4 (A) -> 3 (R) In case of HMVEO, HSVEO 1 (P) -> 2 (B) 4 (A) -> 3 (R)

2. INSTALLATION

2.1 Installation Environment

⚠WARNING

The manual switching valve shall be protected from direct exposure to water or cutting oil during use.

- When using in an environment where it is subjected to water or cutting oil, install the manual switching valve inside a cover or a panel.
- If the cylinder rod is subjected to cutting oil, the cutting oil will enter the secondary piping of the manual switching valve via the cylinder, causing malfunction. In such a case, consult CKD.

Do not use in corrosive gas or solvent environments.

Do not use in the environment with corrosive gases such as sulfurous acid gas and solvents.

Do not use in a humid environment.

Condensation may occur due to temperature changes.

Do not use in an explosive gas atmosphere.

⚠CAUTION

If there is a lot of dust around the product, take measures to prevent foreign matter from entering the exhaust port.

The exhaust port of the manual switching valve may suck foreign matters in the surrounding area due to air supply and exhaust by the valve operation, or foreign matters may enter the port when the exhaust port faces upward. Install a silencer to prevent foreign matter from entering the exhaust port, or install the exhaust port facing downwards.

Avoid use in areas affected by vibration or impact.

Avoid use in areas where vibration exceeds 50 m/s^2 and impact exceeds 300 m/s^2.

When the product is used in places with high ozone concentration, such as coastal areas or lightning-prone areas, be careful about deterioration of packings and gaskets.

Packings and gaskets may deteriorate quickly.
Provide measures such as installation of an ozone remover on the primary side.

2.2 Unpacking

⚠CAUTION

Remove the packaging bag of the manual switching valve immediately before piping.
If the packaging bag is removed before piping, foreign matters may enter the manual switching valve from the piping port, causing failure or malfunction.

- Confirm that the model number you ordered and the model number indicated on the product are the same.
- Check for damage to the exterior of the product.
- Allow space around the manual switching valve for installation, removal, wiring and piping.

2.3 Installing

⚠CAUTION

Do not install the manual switching valve by supporting it with piping.
Install and fix the body of the manual switching valve.

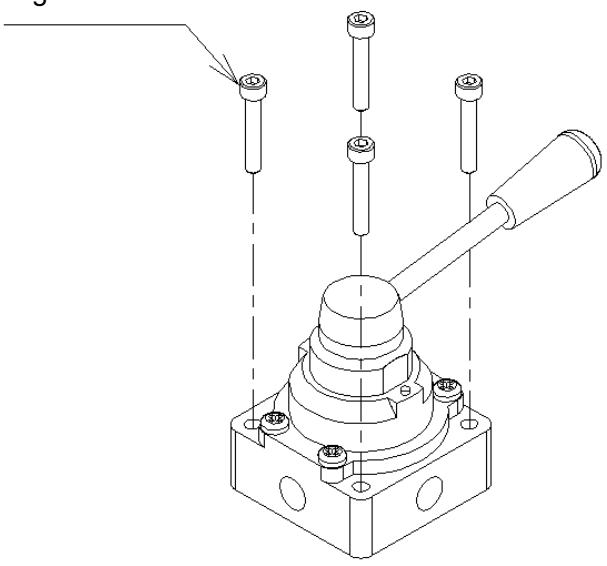
Tighten the screws with a proper torque.
Failure to assemble and tighten properly can cause air leakage, product disconnection and screw breakage.

Installing

■ For direct mounting

It can be installed with four mounting holes provided in the manual switching valve.

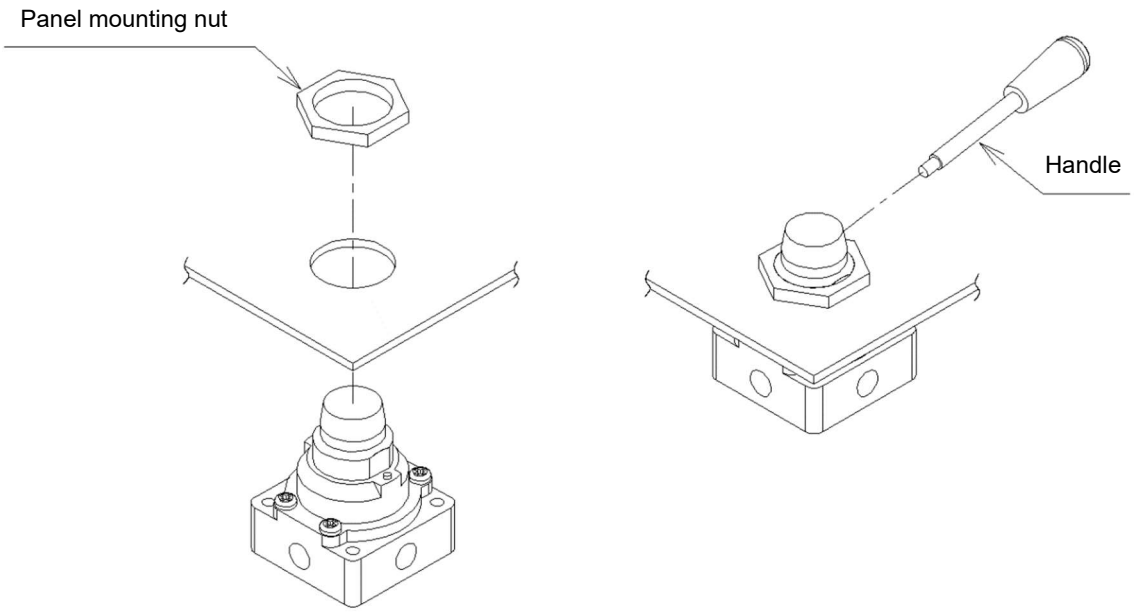
Four mounting screws



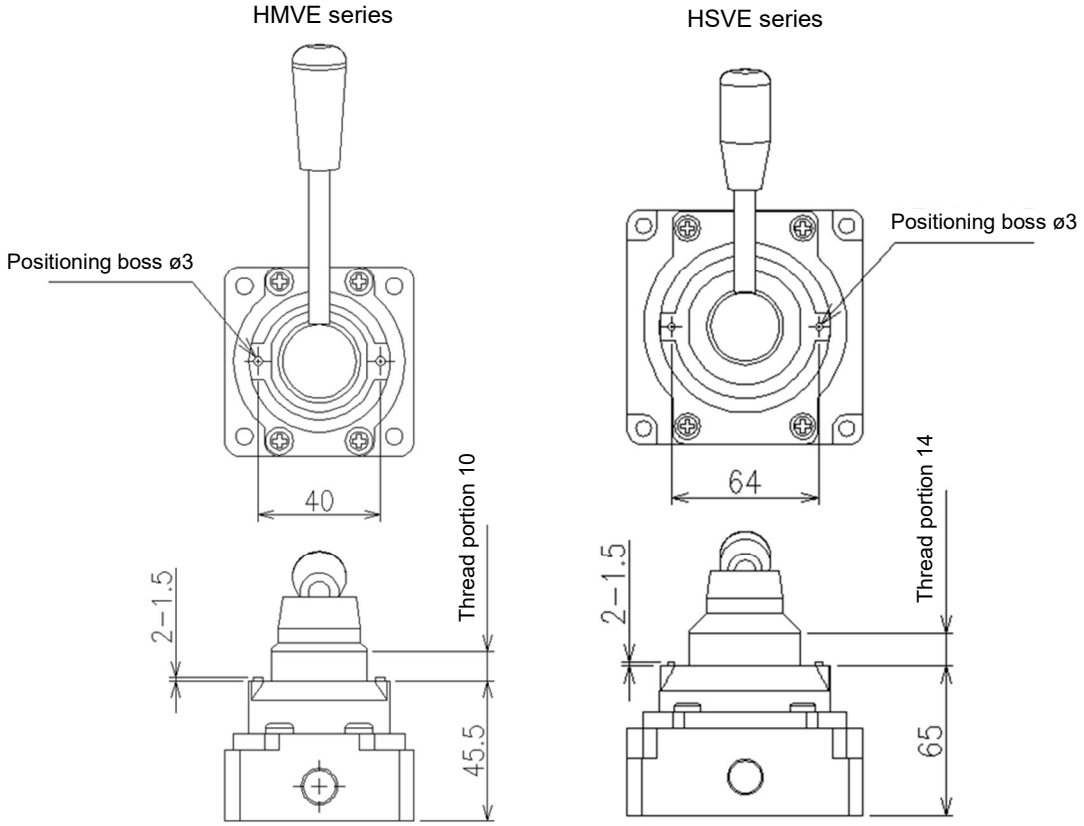
Model number	Mounting screw name	Tightening torque
HMVE	M5	1.4 to 1.6 N·m
HSVE	M6	2.4 to 2.8 N·m

■ For panel mounting

Use dedicated panel mounting nuts for installation.
Install the handle after installing the manual switching valve to the panel.



In deciding the thickness of the panel, refer to the following dimensions and give consideration to the overlap allowance of the panel mounting nuts.
A positioning boss is provided to prevent rotation of the manual switching valve during installation. Drill holes in the panel.



2.4 Piping Method

⚠CAUTION

When connecting the pipes, tighten with proper torque.
The purpose is to prevent air leakage and screw breakage. To avoid damage to the thread, tighten with hand first and then use a tool.

To be piped so that joints are not disconnected due to motion, vibration or tension of the device.

- If the pipe on the exhaust side of the air pressure circuit is disconnected, actuator speed control will become impossible.
- In the case of the chuck holding mechanism, the chuck will lose its holding power when the pipe is disconnected.

When the piping connection is completed and compressed air is supplied, confirm that all joints are free from air leakage.

When the piping connection is completed and compressed air is supplied, prevent sudden application of high pressure.
The pipe connections may be disconnected, causing jumping of piping tubes, posing a risk of accident.

The exhaust port of the manual switching valve shall not be smaller than the diameter of the pipe connection port.
If air is not exhausted smoothly, the actuator will not work properly.

Remove foreign matters.
Rust in the piping may cause malfunction or valve seat leakage.
Install a filter of 5 μm or less immediately before the manual switching valve.

2.4.1 Proper tightening torque

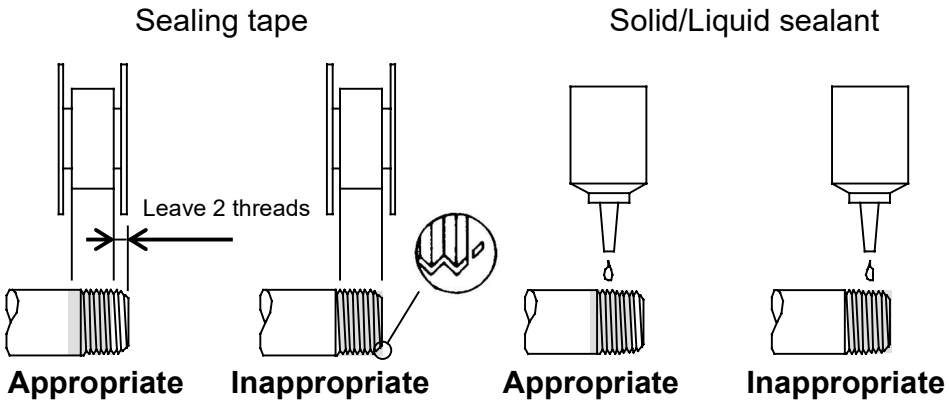
Tightening torque of each connection screw is as follows.

Connection screw	Tightening torque N·m
Rc1/4	6 to 8
Rc3/8	13 to 15
Rc1/2	16 to 18
Rc3/4	19 to 30

2.4.2 Sealant

Place the sealing tape or sealant at least two threads inside the tip of the threaded area. If it extends beyond the threaded portion of the pipe, broken chips of sealing tape or residual sealant will intrude into the manual switching valve due to tightening, causing a failure.

When using a sealing tape, wrap it in the direction opposite to the direction of the thread and press it with your fingertip to ensure perfect adhesion.
When using liquid sealant, be careful to prevent adhesion of the sealant to resin parts. Resin parts may be damaged, causing failure or malfunction. Do not apply sealant to the inner thread side.



2.4.3 Flushing

Flush the pipes, manual switching valve and related devices before piping to remove foreign matters.

2.4.4 Exhaust port

If the exhaust is obstructed, the response of the cylinder may be delayed.

2.4.5 Pipe connection

■ Proper tube

For a solenoid valve with a one-touch joint, use the tube specified by CKD.
- Soft Nylon (F-1500 series)
- Urethane (U-9500 series)

■ About sputtering

Use a flame retardant tube or a steel tube in an atmosphere with sputtering.

■ About hydraulic hoses

Use a hydraulic hose for oil-air pressure piping.
When using a standard one-touch joint for a spiral tube, secure the tube base with a hose band. Otherwise, rotation will occur, reducing the retention capacity.
Use fastening joints in high temperature environments. Use of one-touch joints not allowed.

■ About general commercial tubes

When using commercially available tubes, pay attention to the accuracy of external dimensions, thickness and hardness. When using an urethane tube, use one with a hardness of 93° or more (rubber hardness tester).
If you use a tube that does not satisfy the diameter accuracy and hardness, the chuck force will decline, becoming easy to pull out or difficult to insert.

Tube dimensions

Outer diameter mm	Inner diameter mm	
	Nylon	Urethane
φ4	φ2.5	φ2
φ6	φ4	φ4
φ8	φ5.7	φ5
φ10	φ7.2	φ6.5
φ12	φ8.9	φ8

Outer diameter tolerance

Soft/Hard Nylon	±0.1 mm
Urethane ø4, ø6	+0.1 mm -0.15 mm
Urethane ø8, ø10, ø12	+0.1 mm -0.2 mm

■ Tube bend radius

The bend radius of the tube must be greater than the minimum bend radius. Removal or leakage may occur.

Outer diameter mm	Minimum bend radius mm	
	Nylon	Urethane
φ4	10	10
φ6	20	20
φ8	30	30
φ10	40	40
φ12	55	50

■ Cutting tubes

Use a tube cutter to cut perpendicular to the axial direction. Inserting a tube cut diagonally can cause air leakage.

■ Tube connection state

Provide a straight portion with a length of the outer diameter of the tube used from the tip of the joint to avoid sharp bending at the joint insertion port. The tube tensile force in the transverse direction should not exceed 40 N.

■ Applicable blank plug

For a solenoid valve with a one-touch joint, use the blank plug specified by CKD.

- Blank plug (GWP □-B series) : ø4 to 12 one-touch joints

3. USAGE

⚠WARNING

Consult CKD for specifications when using outside the designated specifications or for special purposes.

3.1 Safety Instructions

Air quality

⚠WARNING

Supply only compressed air.

Use clean air without corrosive gas for compressed air.

⚠CAUTION

Improve the air quality.

Compressed air contains a large amount of drain, oxidized oil, tar, foreign matters and rust from piping, which may cause problems such as malfunction and short life. The exhaust air also pollutes the environment.

For lubrication, use turbine oil Class 1 ISO VG32.

Basically, it is a non-lubrication type, but once lubrication is done, lubrication is required afterwards. Continue to lubricate so that oil does not run out.

Spindle oil and machine oil shall not be used.

Rubber parts will be inflated, resulting in malfunction.

■ Extra dry air

Extra dry air of 0 to 3 humidity class specified by JIS B 8392-1 may result in short life due to splashing of lubricant.

■ Lubrication

Non-lubrication types are standard for HMVE and HSVE series. If lubrication is required, use turbine oil Class 1 ISO VG32.

■ Drain

- Drain is generated when the temperature in the air pressure piping or pneumatic equipment drops.
- If the drain enters the air passage inside the pneumatic equipment and blocks the passage momentarily, malfunction may occur.
- If rust is generated by the drain, failure of the pneumatic equipment may occur.
- If the lubricating oil is washed away by the drain, poor lubrication may occur.

■ Contamination

- Use compressed air that does not contain oxidized oil, tar or carbon from the air compressor.
  Increase in resistance of the sliding portion due to adhesion of oxidized oil, tar or carbon inside the pneumatic equipment may cause malfunction.
  In addition, if lubricating oil is mixed with oxidized oil, tar, carbon, etc., the sliding portion of the pneumatic equipment will be worn.
- Use compressed air that does not contain solid foreign matters.
  Entry of solid foreign matters in compressed air into the pneumatic equipment will cause wear and sticking of the sliding portion.

■ Improvement of air quality

Improve the air quality by dehumidifying with an after cooler dryer, removing foreign matters with a filter and removing tar with a tar removal filter.

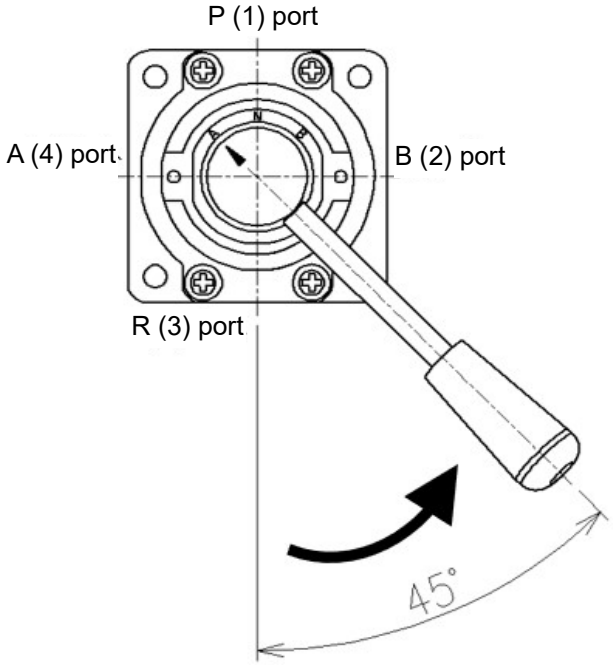
3.2 Manual Operation

⚠WARNING

- **Manual operation should be performed after confirming that no one is near the operating cylinder.**
- **The handle is operated by hand. Operation of the handle with excessive load leads to troubles such as deformation and breakage of the handle.**

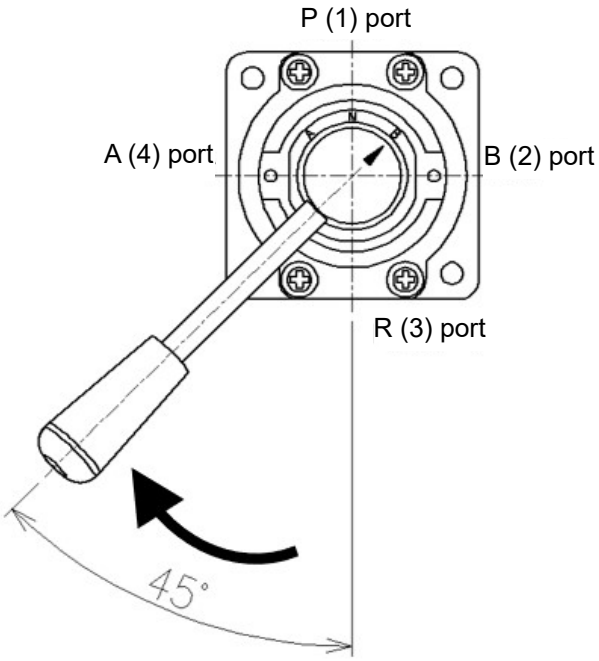
■ A-ON operation

As shown in the figure below, move the handle to the right so that the tip of the arrow is in position A.



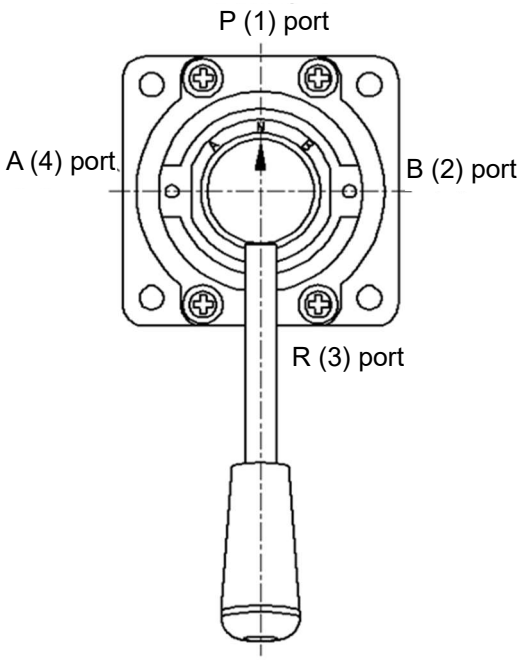
■ B-ON operation

As shown in the figure below, move the handle to the left so that the tip of the arrow is in position B.



■ OFF operation

As shown in the figure below, return the handle to the center so that the tip of the arrow is in position N.



4. MAINTENANCE AND INSPECTION

4.1 Periodic Inspection

⚠WARNING

Before maintenance, stop the supply of compressed air in advance and confirm that there is no residual pressure.
They are necessary to ensure safety.

⚠CAUTION

Daily and periodic inspections shall be carried out systematically so that maintenance management is carried out correctly.
Insufficient maintenance management will lead to significant decline in functions of the product, leading to troubles such as short life, breakage and malfunction, and accidents.

To ensure use of the product in optimal condition, perform one or two periodic inspections per year.

■ Pressure management of supplied compressed air

- Is it supplied at the set pressure?
- Does the pressure gauge indicate the set pressure during operation of the device?

■ Management of pneumatic filter

- Is the drain discharged properly?
- Is the state of dirt on the bowl and elements normal?

■ Management of compressed air leakage from pipe connections

- Are connections in the moving area in normal state?

■ Management of manual switching valve operation state

- Is there any delay in operation?
- Is the exhaust state normal?

■ Management of pneumatic actuator operation state

- Is the operation smooth?
- Is the stop state at terminal normal?
- Is the connection with the load normal?

■ Management of lubricator

- Is the oil amount adjusted properly?

■ Management of lubricating oil

- Is it supplied with proper lubricating oil?

■ Management of thread portion

- Are the threaded portions free from looseness?

5. TROUBLESHOOTING

5.1 Problems, Causes, and Solutions

If the product does not operate as intended, perform inspection according to the table below.

Defect phenomenon	Cause	Treatment method
Does not function	All pilot exhaust ports are blocked	Review the piping
Malfunction	The pressure source is turned off	Turn on the pressure source
	The pressure is insufficient	Readjust the reducing valve, install a booster valve
	The flow rate is insufficient	Review the piping, install a surge tank
	Pressurized from the exhaust side	Review the piping
	Incorrect or forgotten piping	Review the piping
	The speed controller throttle valve is fully closed	Readjust the needle section
	The manual switching valve is frozen	Provide measures against freezing (heat retention, water removal, etc.)
	The exhaust portion is clogged by dust, etc.	Install a cover or silencer, clean the exhaust portion periodically
Large manual operation force	The packing is swollen	Review the oil supply (turbine oil Class 1 ISO VG32), move the solenoid valve away from the places where cutting oil, etc. are used, do not keep organic solvents in the nearby area
	Foreign matters are caught in the packing	Remove foreign matters by blowing

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

6. REFERENCE INFORMATION

6.1 Port Indication

Piping port positions are indicated with 1P, 4A, etc. conforming to ISO, JIS standards.

Port	ISO standard	JIS standard
Supply port	1	P
1st output port	4	A
2nd output port	2	B
Exhaust port	3	R

7. WARRANTY PROVISIONS

7.1 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 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 take precedence.

7.2 Warranty Period

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