CKD

SM—P00083-A

INSTRUCTION MANUAL

4GR-SERIES

PILOT CHECK VALVE

● Please read this instruction manual carefully before using this product, particularly the section describing safety.

● Retain this instruction manual with the product for further consultation whenever necessary.

CKD Corporation

Safety precautions

When designing and manufacturing a device using CKD products, the manufacturer is obligated to manufacture a safe product by confirming safety of the system comprising the following items:

- Device mechanism
- Pneumatic or water control circuit
- Electric control that controls the above

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 someone having sufficient knowledge and experience.

2. Use this product within its specifications.

This product cannot be used beyond its specifications. Additionally, the product must not be modified or machined.
This product is intended for use in general industrial devices and parts. Use beyond such conditions is not considered. Consult with CKD for details when using the product beyond the unique specification range, outdoors, or in the following conditions or environments. In any case, measures for safety shall be provided when the vavle malfunctions.

① Use for special applications requiring safety including nuclear energy, railroad, aviation, ship, vehicle, medical equipment, equipment or applications coming into contact with beverage or food, amusement equipment, emergency shutoff circuits, press machine, brake circuits, or for safeguard.
② Use for applications where life or assets could be adversely affected, and special safety measures are required.

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

SO4414, JIS B 8370 (pneumatic system rules)
JFPS2008 (principles for pneumatic cylinder selection and use)
Including High Pressure Gas Maintenance Law, Occupational Safety and Sanitation Laws, other safety rules, standards and regulations, etc.

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

① Inspect and service the machine and devices after confirming safety of the entire system related to this product.
② Note that there may be hot or charged sections even after operation is stopped.
③ When inspecting or servicing the device, turn off the energy source (air supply or water supply), and turn off power to the facility. Release any compressed air from the system, and pay enough attention to possible water leakage and leakage of electricity.
④ When starting or restarting a machine or device that incorporates pneumatic components, make sure that system safety, such as pop-out prevention measures, is secured.

5. Observe warnings and cautions on the pages below to prevent accidents.

■The safety cautions 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, or when there is a high degree of emergency to a warning.

⚠ **WARNING** :When a dangerous situation may occur if handling is mistaken leading to fatal or serious injuries.

⚠ **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. In any case, important information that must be observed is explained.

Precautions with regard to guarantee

- **Guarantee period**

The guarantee period of our product shall be one (1) year after it is delivered to the place specified by the customer.

- **Guarantee coverage**

If any failure for which CKD CORPORATION is recognized to be responsible occurs within the above warranty period, a substitute or necessary replacement parts shall be provided free of charge, or the product shall be repaired free of charge at the plant of CKD CORPORATION.

However, the guarantee excludes following cases:

① Defects resulting from operation under conditions beyond those stated in the catalogue or specifications.
② Failure resulting from malfunction of the equipment and/or machine manufactured by other companies.
③ Failure resulting from wrong use of the product.
④ Failure resulting from modification or repairing that CKD CORPORATION is not involved in.
⑤ Failure resulting from causes that could not be foreseen by the technology available at the time of delivery.
⑥ Failure resulting from disaster that CKD is not responsible of.

Guarantee stated here covers only the delivered products. Any other damage resulting from failure of the delivered products is not covered by this guarantee.

- **Confirmation of product compatibility**

Our customer shall be responsible of confirming compatibility of our product used in our customer's system, machinery or device.

UNPACKING (Page 10)

⚠ CAUTION : Bags containing pilot check valves should be opened only when you are ready to connect the valves to the pipes immediately afterward.

- If bags are opened before the valves are ready to be connected to the pipes, the entry of foreign matter from the piping ports could cause the solenoid valves to fail or malfunction.

INSTALLATION (Page 11)

⚠ CAUTION : If unit is to going be operated outside operating parameters described in the specifications, please consult us before doing so.

OPERATING ENVIRONMENT (Page 11)

⚠ CAUTION :

a) Please do not apply water droplets or cutting oil.
- If cutting oil gets onto the rod of the cylinder, the oil can get inside the cylinder via the piping, causing malfunction. If this happens, please contact us.

b) Do not use in a corrosive environment or an environment with airborne solvents.
- Do not use in environments with corrosive gases such as sulfuric acid.

c) Vibration, shock.
- Please avoid vibration greater than $49m/s^2$, and shock greater than $294m/s^2$.

d) Humid environments should be avoided, as it leads to precipitation due to temperature change.

e) The packing and gaskets will age faster in environments near coastlines, environments with high thunderstorm activity and places with high ozone concentration.

INSTALLATION INSTRUCTIONS (Page 11)

⚠ WARNING : When mounting the pilot check valve, Please do not follow the instructions given for the supply pipes.

- Please mount the check valve body onto the mounting plates or the DIN rails.

SETTING UP PIPES (Page 13)

⚠ CAUTION :

a) When installing the supply pipes, please apply only the recommended amount of torque.
- Please try to avoid leaks and broken screws. In order to preserve the screw head, please turn the screws by hand before using tools.

b) Please secure the connection of the pipe in such that movements, vibrations and pulls on the pipes do not result in disconnection.
- The speed-control of the actuator can fail if exhaust pipes come loose in the air pressure circuit.
- If the chuck release mechanism is released, anything placed in between it may cause an object to fall, so please use caution before releasing the mechanism.

c) After connecting the supply pipes, please make sure there are no leaks in the connection before supplying pressurized air.

d) When supplying pressurized air, please don't supply high pressure immediately.
- This can result in a failed connection, causing the hose to flail dangerously.

e) Removal of foreign objects.
- Rust and other objects inside the supply pipes can lead to malfunction and leakage. Please place a 5μm (or smaller) filter directly in front of the solenoid valve.

f) Air supply
- Please do not squeeze the air supply pipes. During continuous operation, a drop in pressure can result in lower performance.

MANUAL OVERRIDE FOR RESIDUAL PRESSURE EXHAUST (Page 19)

⚠ WARNING :

a) After you have used the manual override (for residual pressure exhaust), please return it to its original position before returning to normal operation.

The manual override is a common lock/non-lock type, so please make sure it is returned to the unlocked state (OFF state).

b) When using the manual override (for residual pressure exhaust) please make sure that no work is placed on the cylinder and that no one is nearby.

AIR QUALITY (Page 20)

⚠ WARNING :

a) Do not supply anything other than compressed air.

b) Supply clean compressed air without any mixture of corrosive gas.

⚠ CAUTION :

a) Compressed air usually contains a large amount of drain, oxidized oil, tar, foreign matter, and rust from the piping. Filter out those elements in the supplied air because they may cause a malfunction and decrease service life. In addition, clean the exhaust before it is released to the air to minimize pollution.

b) Once you have lubricated a pre-lubricated valve, the valve is no longer capable of running without being lubricated from the outside. Do not leave the valve without lubrication but keep it lubricated.

c) Do not use spindle oil or machine oil? They may induce expansion of the rubber parts, which may cause a malfunction.

PERIODIC INSPECTION (Page 22)

⚠ WARNING : Before providing a maintenance service, cut the power and the supply of compressed air and confirm the absence of residual pressure.

The above is required to ensure safety.

⚠ CAUTION : Regularly perform the daily and periodic inspections to correctly maintain product performance.

If the product is not correctly maintained, product performance may deteriorate dramatically, resulting in a shorter service life, fractures of components, and malfunctions.

ADDING EXTRA MANIFOLDS (Page 23)

⚠ WARNING : If you plan to disassemble/assemble the manifold, please make sure you've read the user's manual carefully.

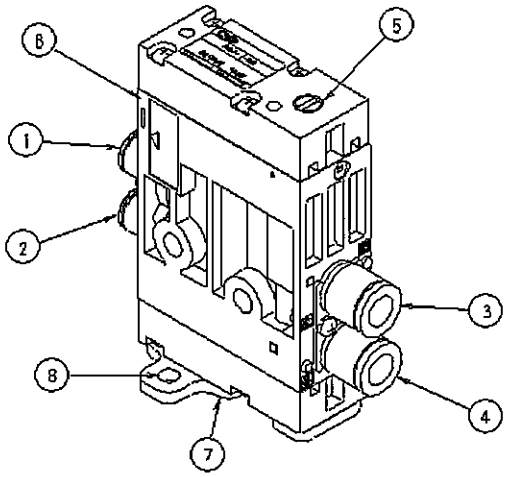
- Be aware of the operation and mechanisms of the pilot check valve to ensure you are knowledgeable about safe operation.
- You should have greater than level 2 certification as an air pressure technician.
- Before disassemble/assemble the manifold, cut the supply of compressed air and confirm the absence of residual pressure.

INDEX

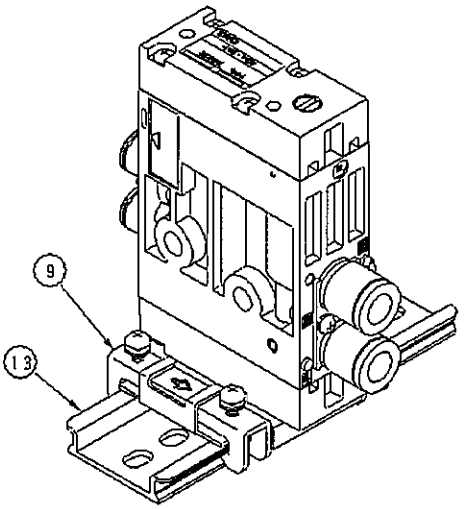
4GR SERIES
Pilot Check Valve
Manual No. SM-P00083-A

Prepared: December 4, 2015

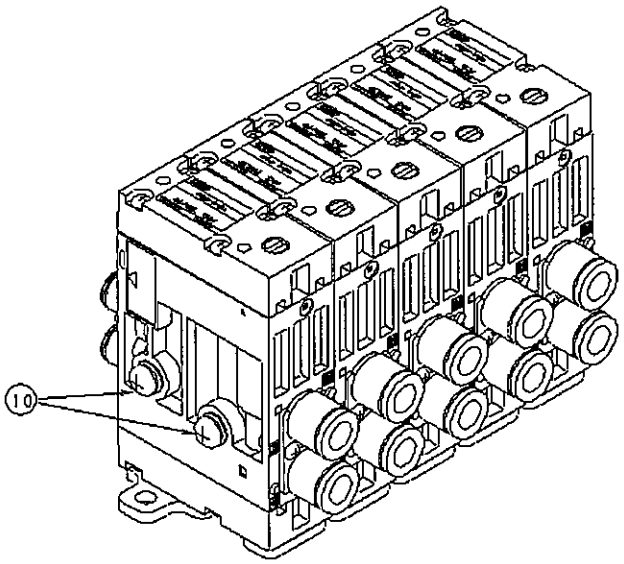
1. PRODUCT



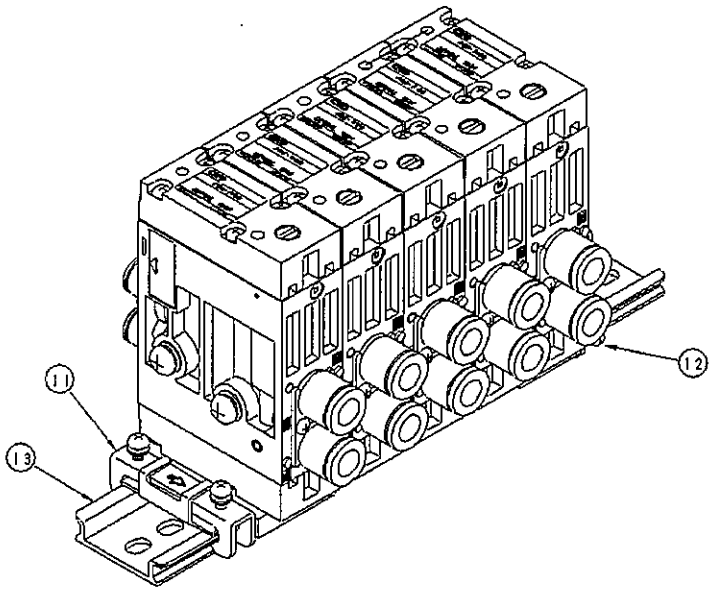
Pilot check valve (mounting plate type)



Pilot check valve (DIN-rail mounted type)



Pilot check valve manifold (mounting plate type)



pilot check valve manifold (DIN-rail mounted type)

No.	Name	Description
①	Output port 2 (B')	Indicates the output port 2 (B) on the switching valve side (primary side).
②	Output port 4 (A')	Indicates the output port 4 (A) on the switching valve side (primary side).
③	Output port 2 (B)	Indicates the output port 2 (B) on the cylinder side (secondary side).
④	Output port 4 (A)	Indicates the output port 4 (A) on the cylinder side (secondary side).
⑤	Manual override for releasing residual pressure	Manually operated device for releasing residual pressure from the secondary side.
⑥	"Switching valve side" flag	Flags the location of the port on the switching valve side (primary side).
⑦	Mounting plate	Plate to mount pilot check valve to device.
⑧	Mounting holes	Holes used to attach the M5 bolt to the device.
⑨	DIN-rail adapter	Used for mounting individual PCs (pilot checks) to DIN-rails.
⑩	Tie-rod kit	Used for chaining together manifolds.
⑪	DIN-rail adapter L (left type)	Used for mounting PCs (pilot checks) to DIN-rails
⑫	DIN-rail adapter L (right type)	Used for mounting PCs (pilot checks) to DIN-rails
⑬	DIN-rail	

2. INTERNATIONAL SYSTEM OF UNITS (SI) AND PORT INDICATION

2.1 Port Indication

Each piping port is marked with ISO and JIS conformable piping port indication codes like 4A and 2B.

Application	ISO	JIS
Output port	4	A
Output port	2	B

- By the display of on the side "switching valve side", please distinguish between the primary side and secondary side of the output port. Connect the solenoid valve to the port labeled "switching valve side". **If the wrong connection, cylinder does not operate.**

2.2 Conversion between International System of Units (SI) and Conventional Units

In this manual, values are expressed using the International System of Units (SI). Use the table below to convert them into values expressed in conventional units.

Table of conversion between SI units and conventional units
(The values printed in Bolds fonts are values given in the International System of Units (SI)):

Example (converting a pressure value):
1kgf/cm^2 → **0.980665Mpa**　　**1MPa** → 1.01972×10kgf/cm^2

- Force

N	dyn	kgf
1	1×10^5	1.01972×10^{-1}
1×10^{-5}	1	1.01972×10^{-6}
9.80665	9.80665×10^5	1

- Stress

Pa or N/m^2	MPa or N/mm^2	kgf/mm^2	kgf/cm^2
1	1×10^{-6}	1.01972×10^{-7}	1.01972×10^{-5}
1×10^6	1	1.01972×10^{-1}	1.01972×10
9.80665×10^6	9.80665	1	1×10^2
9.80665×10^4	9.80665×10^{-2}	1×10^{-2}	1

※:1Pa=1N/m^2, 1MPa=1N/mm^2

- Pressure

Pa	kPa	MPa	bar	kgf/cm^2	atm	mmH2O	MmHg or Torr
1	1×10^{-3}	1×10^{-6}	1×10^{-5}	1.01972×10^{-5}	9.86923×10^{-6}	1.01972×10^{-1}	7.50062×10^{-3}
1×10^3	1	1×10^{-3}	1×10^{-2}	1.01972×10^{-2}	9.86923×10^{-3}	1.01972×10^2	7.50062
1×10^6	1×10^3	1	1×10	1.01972×10	9.86923	1.01972×10^5	7.50062×10^3
1×10^5	1×10^2	1×10^{-1}	1	1.01972	9.86923×10^{-1}	1.01972×10^4	7.50062×10^2
9.80665×10^4	9.80665×10	9.80665×10^{-2}	9.80665×10^{-1}	1	9.67841×10^{-1}	1×10^4	7.35559×10^2
1.01325×10^5	1.01325×10^2	1.01325×10^{-1}	1.01325	1.01323	1	1.03323×10^4	7.60000×10^2
9.80665	9.80665×10^{-3}	9.80665×10^{-6}	9.80665×10^{-5}	1×10^{-4}	9.67841×10^{-5}	1	7.35559×10^{-2}
1.33322×10^2	1.33322×10^{-1}	1.33322×10^{-4}	1.33322×10^{-3}	1.35951×10^{-3}	1.31579×10^{-3}	1.35951×10	1

※:1Pa=1N/m^2

3. UNPACKING

> ⚠ **CAUTION :** Bags containing pilot check valves should be opened only when you are ready to connect the valves to the pipes immediately afterward.
>
> - If bags are opened before the valves are ready to be connected to the pipes, the entry of foreign matter from the piping ports could cause the pilot check valves to fail or malfunction.

a) Check the model number imprinted on the product to make sure that the product you received is exactly the product you ordered.
b) Check the exterior of the product for any damage.
c) Before using the product, read the supplied documentation.

4. INSTALLATION

⚠ CAUTION : If unit is to going be operated outside operating parameters described in the specifications, please consult us before doing so.

4.1 Operating environment

⚠ CAUTION :

a) Please do not apply water droplets or cutting oil.
- If cutting oil gets onto the rod of the cylinder, the oil can get inside the cylinder via the piping, causing malfunction. If this happens, please contact us.

b) Do not use in a corrosive environment or an environment with airborne solvents.
- Do not use in environments with corrosive gases such as sulfuric acid.

c) Vibration, shock.
- Please avoid vibration greater than 49m/s^2、and shock greater than 294m/s^2.

d) Humid environments should be avoided, as it leads to precipitation due to temperature change.

e) The packing and gaskets will age faster in environments near coastlines, environments with high thunderstorm activity and places with high ozone concentration.

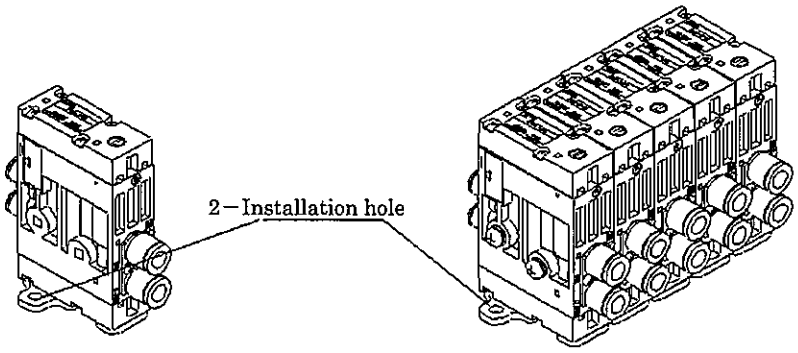
4.2 Installation instructions

⚠ WARNING : When mounting the pilot check valve, Please do not follow the instructions given for the supply pipes.
- Please mount the check valve body onto the mounting plates or the DIN rails.

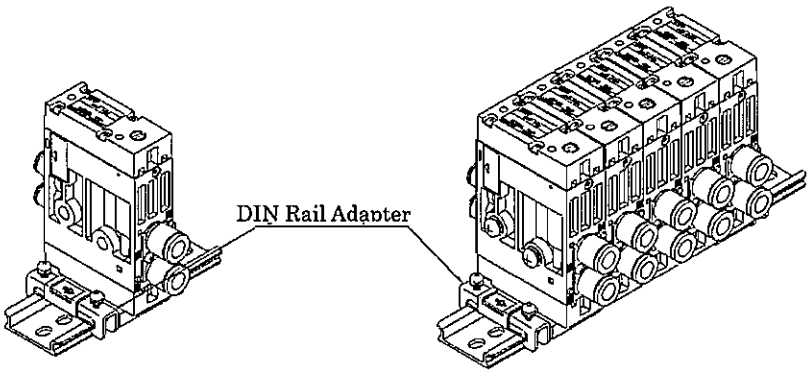
4.2.1 Please leave enough space in the vicinity of the pilot check valve for installation, removable and servicing of the supply pipes.

4.2.2 Installation

1) For installation to a mounting plate
   Please use the two mounting holes on the mounting plates.

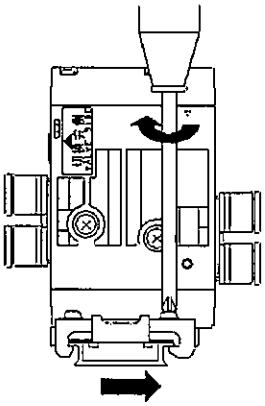


2) For installation to a DIN-rail
   Please secure the DIN-rail adapter to the DIN-rail.

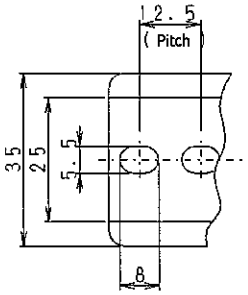


(DIN-rail adapter)

When installing onto the DIN rail, please make sure the end retainer clips on DIN-rail adapter kit are hooked onto the rail. Align with the arrows and screw into place. (Optimal torque for screws: 1.4N・m)



Please consult the figure to the right for the dimensions of the screw holes.



4.3 Setting up pipes

⚠ CAUTION :

a) When installing the supply pipes, please apply only the recommended amount of torque.
- Please try to avoid leaks and broken screws. In order to preserve the screw head, please turn the screws by hand before using tools.

b) Please secure the connection of the pipe in such that movements, vibrations and pulls on the pipes do not result in disconnection.
- The speed-control of the actuator can fail if exhaust pipes come loose in the air pressure circuit.
- If the chuck release mechanism is released, anything placed in between it may cause an object to fall, so please use caution before releasing the mechanism.

c) After connecting the supply pipes, please make sure there are no leaks in the connection before supplying pressurized air.

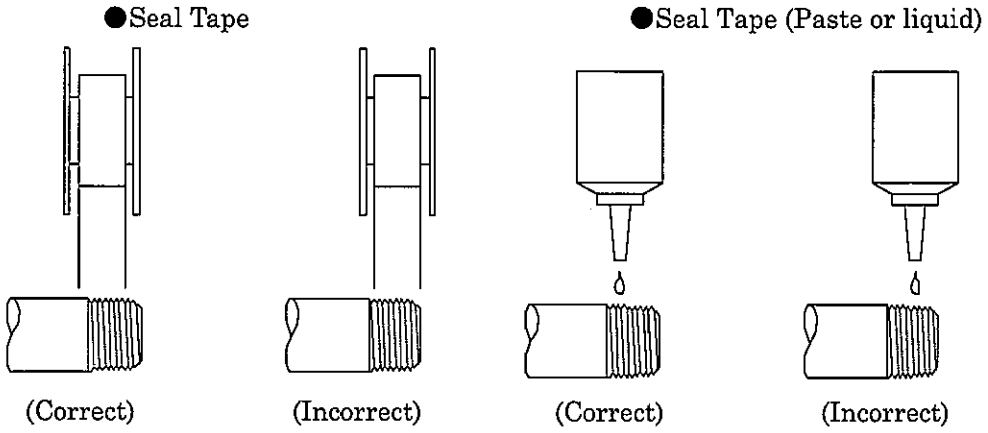
d) When supplying pressurized air, please don't supply high pressure immediately.
- This can result in a failed connection, causing the hose to flail dangerously.

e) Removal of foreign objects.
- Rust and other objects inside the supply pipes can lead to malfunction and leakage. Please place a 5μm (or smaller) filter directly in front of the solenoid valve.

f) Air supply
- Please do not squeeze the air supply pipes. During continuous operation, a drop in pressure can result in lower performance.

4.3.1 Seal material

When using seal material, take care to avoid getting it in the pipes or overflowing on the exterior surface of the pipes.



When applying fluororesin sealing tape to the screw threads, wind the tape two or three times around the threads but leave the one or two threads at the pipe end uncovered. Firmly press the tape against the threads using the tip of your fingernail. When applying liquid type seal material, apply the material to all the threads except one or two threads at the pipe end and take care not to apply too much of it.

Never apply the seal material to the female threads in the device side piping port.

4.3.2 Flushing

Before connecting pipes, flush the interiors of the tubes, solenoid valves, and connected devices to remove foreign matter.

4.3.3 Exhaust port

Minimize the restriction to the flow of the exhaust air because such restriction may cause a delay in the cylinder response. If such a delay happens, the speed needs to be adjusted between the cylinder and solenoid valve.

4.3.5 Pipe connections

(1) Tubes to be used

For use with solenoid valves with push-in fitting, select tubes of the type specified by us:

Soft nylon tubes	(F-1500 Series)
Urethane tubes	(U-9500 Series)

(2) For installation at a site that has spatters in the air, select incombustible tubes or metal pipes.

(3) For a piping used for both hydraulic and pneumatic controls, select a hydraulic hose.

When combining a spiral tube with a standard push-in fitting, fix the tube origin using a hose band. Otherwise the rotation of the tube will decrease the efficiency of the clamping.

For use in a high-temperature atmosphere, select fastener joints instead of push-in fitting.

(4) When selecting from tubes commercially available, carefully study the accuracy of the outside diameter as well as the wall thickness and the hardness. The hardness of an urethane tube should be 93° C or more (as measured by a rubber hardness meter).

With a tube that does not have a sufficient accuracy of the outside diameter or the specified hardness, a decrease in the chucking force may cause disconnection or difficulty in inserting.

Tube dimensions

Outside diameter mm	Inside diameter mm	
	Nylon	Urethane
φ4	φ2.5	φ2
φ6	φ4	φ4
φ8	φ5.7	φ5
φ10	φ7.2	φ6.5

Outside diameter allowance

Soft or hard nylon		±0.1mm
Urethane	φ4, φ6	+0.1mm -0.15mm
Urethane	φ8, φ10	+0.1mm -0.2mm

(5) Minimum bending radius of tubes

Observe the minimum bending radius of tubes. Neglecting the minimum bending radius may cause disconnection or leaks.

Tube bore	Minimum bending radius mm	
	Nylon	Urethane
φ4	10	10
φ6	20	20
φ8	30	30
φ10	40	40

(6) Cutting a tube

To cut a tube, use a tube cutter to cut the tube perpendicularly to the length of the tube. Inserting an obliquely cut end of a tube may cause air leakage.

(7) Tube connections

Do not bend the tube immediately at the fitting connection point. Lead it out straight from the end of the fitting for a length equal to or greater than the outside diameter of the tube. The tension applied sideways through the tube should not exceed 40N.

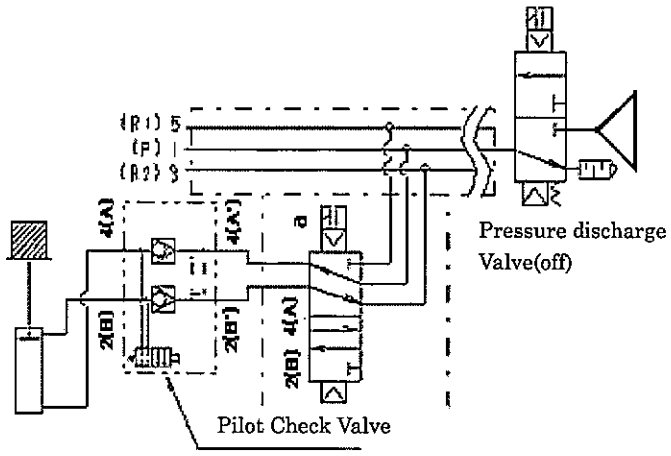
5. OPERATING RECOMMENDATION

5.1 Operation instructions

1) Explanation of the circuit

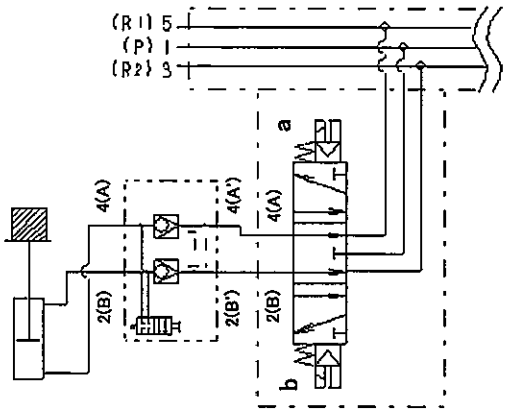
When using the circuit in combination with the 2-position solenoid valve, the pilot check valve can be used to prevent the cylinder from falling if the base pressure drops.

Example of how to prevent falling cylinder



When used together with the ABR solenoid connection valve, it can be used as an all port blocking valve.

Example of use as an intermediate stopper



Cylinder control	Base pressure	Solenoid valve		Pilot check valve	Cylinder
		Solenoid	Flow path		
Full stroke operation	Supplied	a on	1(P)→4(A) 2(B)→3/5(R)	4(A')→4(A) increasing pressure 2(B)→2(B') exhaust	4(A) increasing pressured 2(B) exhaust
	Supplied	a off (b on)	1(P)→2(B) 4(A)→3/5(R)	4(A)→4(A')exhaust 2(B')→2(B) increasing pressure	4(A) exhaust 2(B) increasing pressure
Fall prevention	Residual pressure removal	a on	1(P)→4(A) 2(B)→3/5(R)	4(A)、2(B) both preserved	4(A) increasing pressure preserved 2(B) atmospheric pressure preserved
	Residual pressure removal	a off (b on)	1(P)→2(B) 4(A)→3/5(R)	4(A)、2(B) both preserved	4(A) atmospheric pressure preserved 2(B) increasing pressure preserved
Intermediate stop (3 position ABR)	Supplied	off (Neutral)	4(A)→3/5(R) 2(B)→3/5(R)	4(A)、2(B) both preserved	4(A) increasing pressure preserved 2(B) increasing pressure preserved

2) Operation Principles

−1. While cylinder is in operation

As shown in figure A, open and close the check valve on the free flow intake side, reload the pressure in the cylinder, and allow for the exhaust to expel by repeatedly opening and closing the check valve on the exhaust side caused by the pilot controls for ports 4(A) and 2(B).

−2. Fall prevention, intermediate stop

① By forcing the residual pressure out of the primary side, a pressure differential will form between the primary and secondary sides, causing the check valve to seal.

② At the same time, due to the loss of pilot pressure which has been pressurizing the spool, the spool will be pressed to the center due to the spring force. This causes the check valve on the exhaust side to shut and seal.

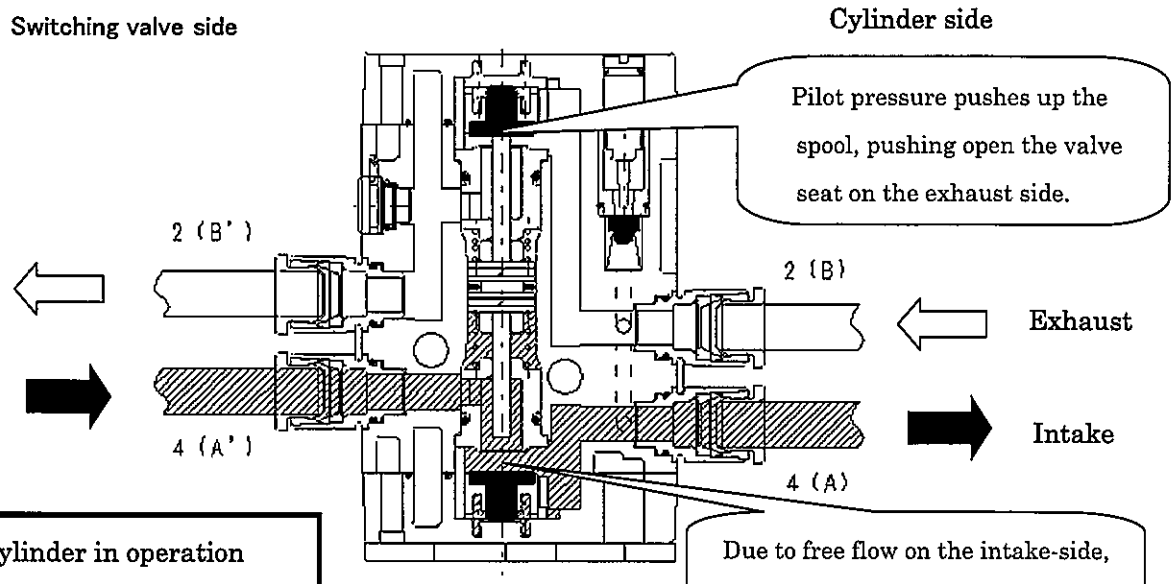


Fig.A Cylinder in operation

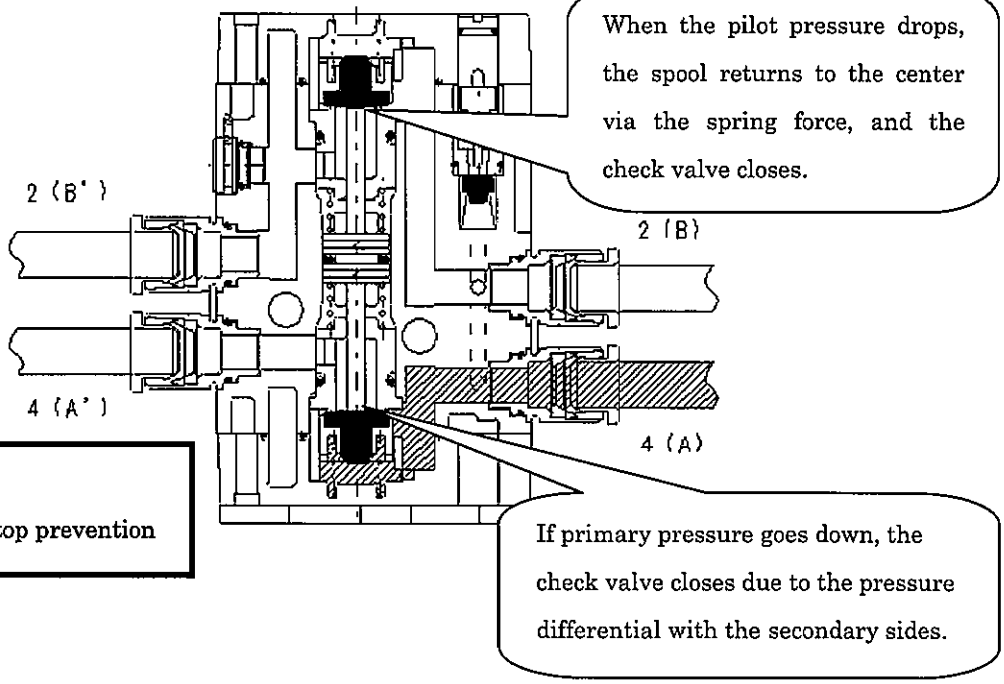


Fig.B Fall prevention, intermediate stop prevention

5.2 Manual override for residual pressure exhaust·

⚠ WARNING :

a) After you have used the manual override (for residual pressure exhaust), please return it to its original position before returning to normal operation.

The manual override is a common lock/non-lock type, so please make sure it is returned to the unlocked state (OFF state).

b) When using the manual override (for residual pressure exhaust) please make sure that no work is placed on the cylinder and that no one is nearby.

(1) A manual override for residual pressure exhaust for the secondary side pressure is standard equipment on the pilot check valve.

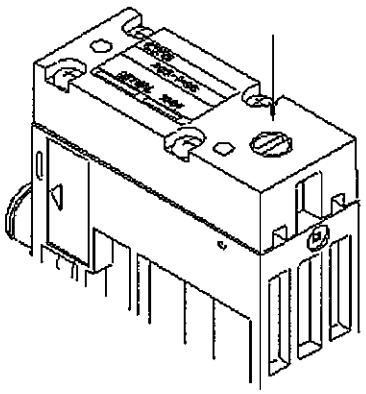
(2) On the standard type, a shared manual override for the lock type and non-lock type manual override is included. If you push the manual override, the residual pressure is released. The device will lock if turned. When locking the device, please push then turn. If you turn without pushing, the manual override may break or lead to air leakage.

(3) The manual non-lock type (option sign M) cannot be turned (locked).

5.2.1 How to operate the manual override

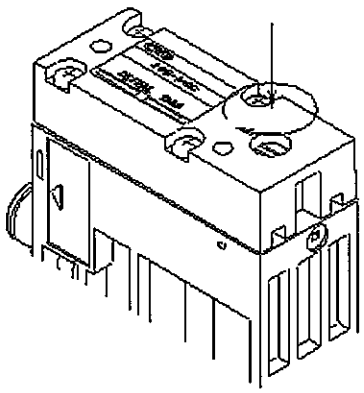
1) Push/non-lock operation

Please push the lock until it stops in the position shown by the arrow below. If released, the manual override will no longer be in use.



2) Push/lock operation (for lock/non-lock shared type)

After pushing, rotate 90° as indicated by the arrow below. If you let go, the manual override will still be in use.



5.3 AIR QUALITY

⚠ WARNING :

a) Do not supply anything other than compressed air.

b) Supply clean compressed air without any mixture of corrosive gas.

⚠ CAUTION :

a) Compressed air usually contains a large amount of drain, oxidized oil, tar, foreign matter, and rust from the piping. Filter out those elements in the supplied air because they may cause a malfunction and decrease service life. In addition, clean the exhaust before it is released to the air to minimize pollution.

b) Once you have lubricated a pre-lubricated valve, the valve is no longer capable of running without being lubricated from the outside. Do not leave the valve without lubrication but keep it lubricated.

c) Do not use spindle oil or machine oil. They may induce expansion of the rubber parts, which may cause a malfunction.

5.3.1 Lubrication

The Pilot Check Valve 4G2R-PCS use pre-lubricated valves that usually do not require lubrication from the outside. If you have to lubricate a valve, use Type 1 turbine oil (ISO-VG32) without additives.

Excessive lubrication and extremely low pressure may cause a longer response time. The response time in the catalogue assumes no lubrication from the outside and the air supply pressure of 0.5 MPa.

5.3.2 Ultra-dry compressed air

The use of ultra-dry compressed air will cause splashing of the lubrication oil and result in a shorter service life.

5.3.3 Drain

(1) The drain is produced by a drop of temperature in pneumatic piping and devices.
(2) The drain may enter and instantaneously block a passage inside a pneumatic device and cause a malfunction.
(3) The drain accelerates the production of rust, which may cause the failure of pneumatic devices.
(4) The drain may wash away the lubrication oil, causing a malfunction from the lack of lubrication.

5.3.4 Foreign matter in the compressed air

1) Supply clean compressed air that does not include oxidized oil, tar, carbon, or other foreign matter from the air compressor.

   (1) If oxidized oil, tar, carbon, or the like enters a pneumatic device and sticks to its components, an increase in the resistance at sliding portions may cause a malfunction.
   (2) If oxidized oil, tar, carbon, or the like is mixed with the supplied lubrication oil, wear of the sliding components of the pneumatic device may be accelerated.

2) Supply clean compressed air that does not include solid foreign matter.

   (1) Solid foreign matter in the compressed air may cause wear of the sliding components of the pneumatic device or stick to such components and cause hydraulic lock.

5.3.5 Cleaning the supplied air

Compressed air usually contains a large amount of drain (water, oxidized oil, tar, and foreign matter). Remove these elements and clean the supplied air because they may cause a failure of the Pneumatic equipment. For example, remove the humidity using an after-cooler dryer and remove the tar using a tar filter.

6.MAINTENANCE

6.1 Periodic Inspection

⚠ WARNING : Before providing a maintenance service, cut the power and the supply of compressed air and confirm the absence of residual pressure.

- The above is required to ensure safety.

⚠ CAUTION : Regularly perform the daily and periodic inspections to correctly maintain product performance.

- If the product is not correctly maintained , product performance may deteriorate dramatically, resulting in a shorter service life, fractures of components, and malfunctions.

1) To use the pilot check valve under optimum conditions, perform a periodic inspection once or twice a year.

2) Check the screws for loosening and the joints in the piping for integrity of the sealing. Regularly remove the drain from the air filters.

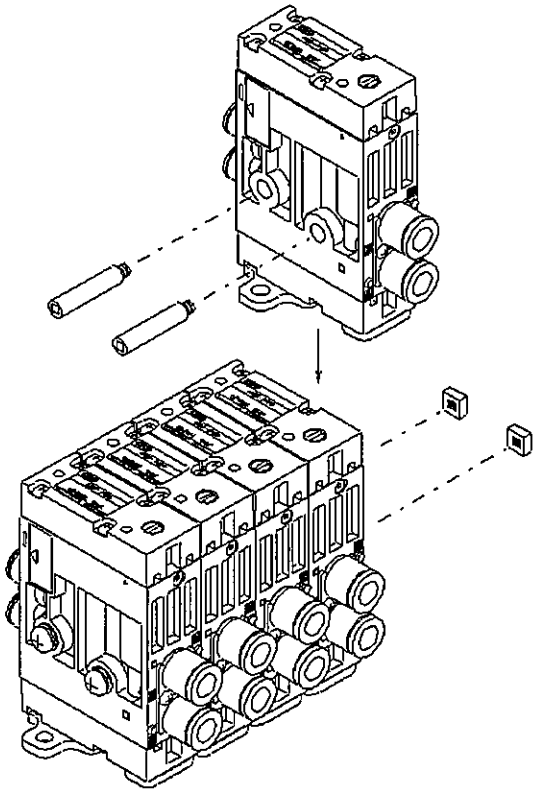
   (1) Checking the compressed air supply pressure:
   Is the supply pressure at the specified level?
   Does the pressure gauge indicate the specified pressure when the system is operating?
   (2) Checking the air filters:
   Is the drain normally discharged?
   Is the amount of dirt attached to the bowl and element at a normal level?
   (3) Checking joints in the piping for the leakage of compressed air:
   Are the pipes normally connected at joints, especially at the movable parts?
   (4) Checking the operation of solenoid valves:
   Is not there any delay in the operation? Is the exhaust flow normal?
   (5) Checking the operation of pneumatic actuators:
   Is the operation smooth?
   Does the actuator stop normally at the end of the stroke?
   Is the coupling with the load normal?
   (6) Checking the lubricator:
   Is the amount of oil adjusted properly?
   (7) Checking the lubrication oil:
   Is the supplied lubrication oil of the type specified by the manufacturer?

6.2 Adding extra manifolds

⚠ WARNING: If you plan to disassemble/assemble the manifold, please make sure you've read the user's manual carefully.

- Be aware of the operation and mechanisms of the pilot check valve to ensure you are knowledgeable about safe operation.
- You should have greater than level 2 certification as an air pressure technician.
- Before disassemble/assemble the manifold, cut the supply of compressed air and confirm the absence of residual pressure.

6.2.1 Manifold parts diagram



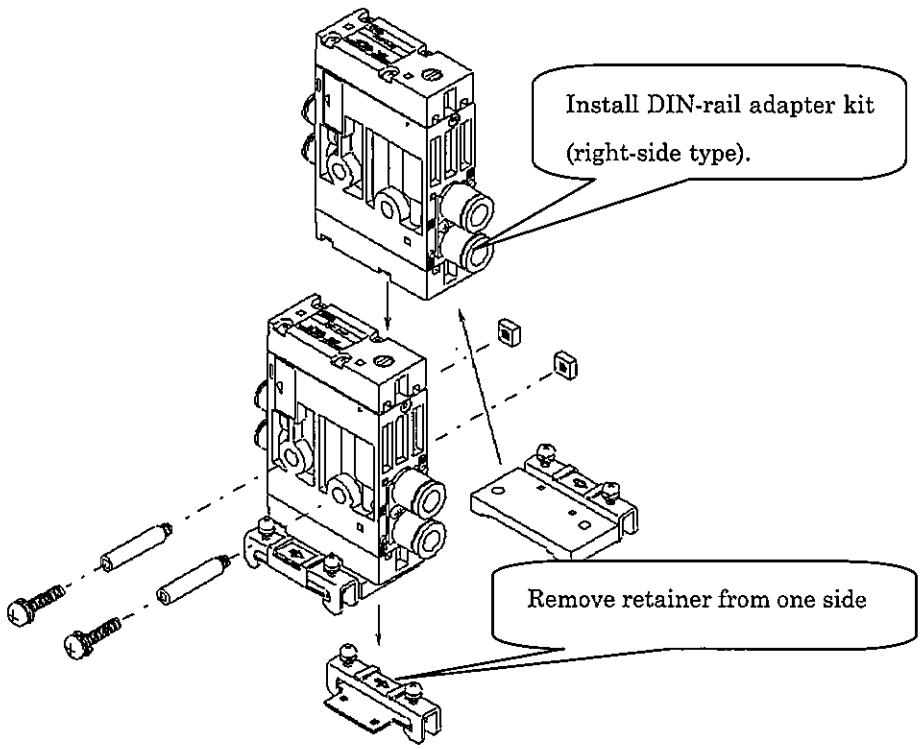
6.2.2 Chaining together pilot check valves

(1) Remove the square nuts (2) from the tie rod that attaches the manifolds together.
(2) Separate the pilot check valves from the area where you want to add extra pilot check valves, and remove the tie rods.
(3) Connect the tie rods for the valves to be chained together.
(4) Use the tie rods on the pilot check valves to be added, and push them together to form a tight seal.
(5) Check that there is no space between the valves and there is no play with respect to the mounting plate, and then tighten the square nuts.
(Recommended torque: 1.1～1.2N·m)

6.2.3 Assembly of DIN-rail mounted type

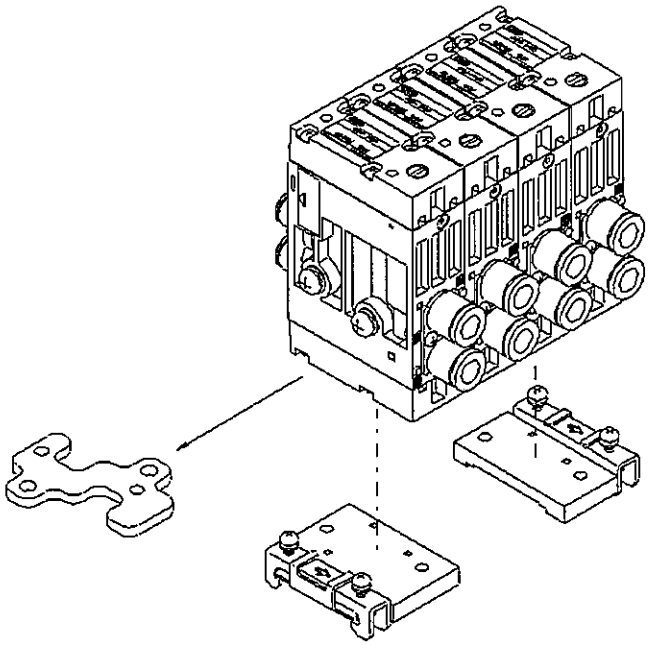
1. Chaining together manifolds

   To chain together extra manifolds (> 2), follow the instructions given in 6.2.2. When going from single to 2-in-series, remove the retainer on one side of the DIN-rail adapter kit (single unit), and install the DIN-rail adapter kit (right-side type) to the pilot check valve (torque to 1.1～1.2N·m). Then pass the tie-rod through the pilot check valve and connect with a square nut.



2. Converting from plate mounted type to DIN-rail mounted type.

   Remove the mount plate and install the DIN-rail adapter kit to both ends of the manifold.



7. MALFUNCTIONS AND SOLUTIONS

Trouble shooting

Symptoms	Probable cause	Solution
Cylinder doesn't work (Works anomalously)	Pilot check valve is installed backwards (switching side/cylinder side).	Install it correctly
	The speed controller metering valve is open all the way	Adjust the needle
	A or B port open to air	Use a joint that is less than or equal the P port joint
	Pressure is not being supplied	Supply pressure
	Insufficient pressure	Re-adjust regulator. Add pressurizing valve.
	Insufficient flow	Re-examine pipe connections、 re-examine flow at the solenoid valve
	Pipes not connected properly	Re-examine pipe connections
Cylinder does not retain position during emergency stops	There is a leak between the pilot check valve to the cylinder on the secondary side pipes	Check for leakage in pipes
	Insufficient pressure	Re-adjust regulator. Add pressurizing valve.

8. PRODUCT SPECIFICATIONS AND STYLE OF INDICATON OF THE MODEL NUMBER

8.1 Product specifications

Model number / Item		4G2R-PCS
Working fluid		Compressed air
Operation method		Pilot operated type
Valve structur		Check valve
Min. working pressure	MPa	0.2
Max. working pressure	MPa	0.7
Proof pressure	MPa	1.05
Ambient temperature	°C	−5～55
Fluid temperature	°C	5～55
Effective sectional area (Note 1)	mm^2	12
Manual override		Common (standard) for non-locked and locked types (option symbol "M" is non-locked types)
Lubrication	(Note 2)	Not required
Vibration resistance	m/s^2	49 or less
Shock resistance	m/s^2	294 or less
Atmosphere		Containing corrosive gas is not permissible

Note 1 :The value of the case of using the φ8 push in fitting.

Note 2 : Use the turbine oil Class 1 ISO VG32 if lubricated. Excessive or intermittent lubrication results in unstable operation.

8.2 How to order

- Discrete pilot check valves

4G2R-PCS- (C4) - (F)

- Pilot check valve manifold

M4G2R-PCS- (C4) - (F) - (2)

(a) (b) (c)

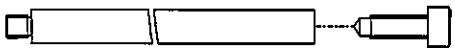
(a) Connection diameter			(b) Options		(c) Chaining	
Symbol	Valve-side port	Cylinder-side port	Symbol	Meaning	Symbol	Meaning
C4	φ4 push-in fitting	φ4 push-in fitting	Blank	None (Note1)	2	2-in-series
C6	φ6 push-in fitting	φ6 push-in fitting	F	Internal A・B port filter	～	
C8	φ8 push-in fitting	φ8 push-in fitting	M	Manual non-locked override	10	10-in-series
CL6	φ6 push-in fitting	φ6 L type push-in fitting (upward)	D	DIN-rail mounted type		
CL8	φ8 push-in fitting	φ8 L type push-in fitting (upward)				

Note1: If you select the "None" in the "(b)Options" symbol.

Manual override : lock/non lock shard type. Installation: mounting plate type

8.3 Related products

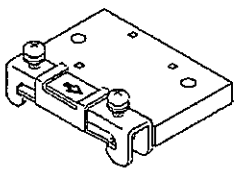
1) Tie rod kit



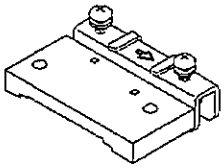
Part number	Type (quantity)
4G2R-PCS-TR-V1	For 1 station (2)
4G2R-PCS-TR-V2	For 2 stations (2)
4G2R-PCS-TR-V3	For 3 stations (2)
4G2R-PCS-TR-V4	For 4 stations (2)
4G2R-PCS-TR-V5	For 5 stations (2)

Select the V1 to V5 combination when using six and over stations.

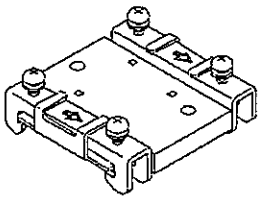
2) DIN rail adapter kit



Left



Right



Discrete

Part.No	Type	DIN rail adaptor kit selection list based on changes in specifications				Descriptions
		Change from mounting plate to DIN rail		Increase/decrease stations with DIN rail mount		
		1 station	2 stations and over	2 stations and over → 1 station	1 station → 2 stations and over	
4G2R-PCS-D1	Right				● (Note1)	DIN rail adaptor (right) 1, thread 2
4G2R-PCS-D2	Right + left		●			DIN rail adaptor (right) 1, DIN rail adaptor (left) 1, thread 4
4G2R-PCS-D3	Discrete	●		●		DIN rail adaptor (discrete) 1, thread 2

Note 1: When changing from 1 station to 2 and over stations, purchase the DIN rail adaptor for right (D1), and remove the retainer on one side from the current DIN rail adaptor kit (D3).