CKD

SM－258177－A

INSTRUCTION MANUAL

MINIATURE IN-OUT SPEED CONTROL VALVE

SCD－$\begin{matrix}M3\\M5\end{matrix}$－S,A

- 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.**

   ISO4414, 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.

 : 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.

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SCD-M3・M5-S,A
Miniature in-out speed control valve
Manual No. SM-258177-A

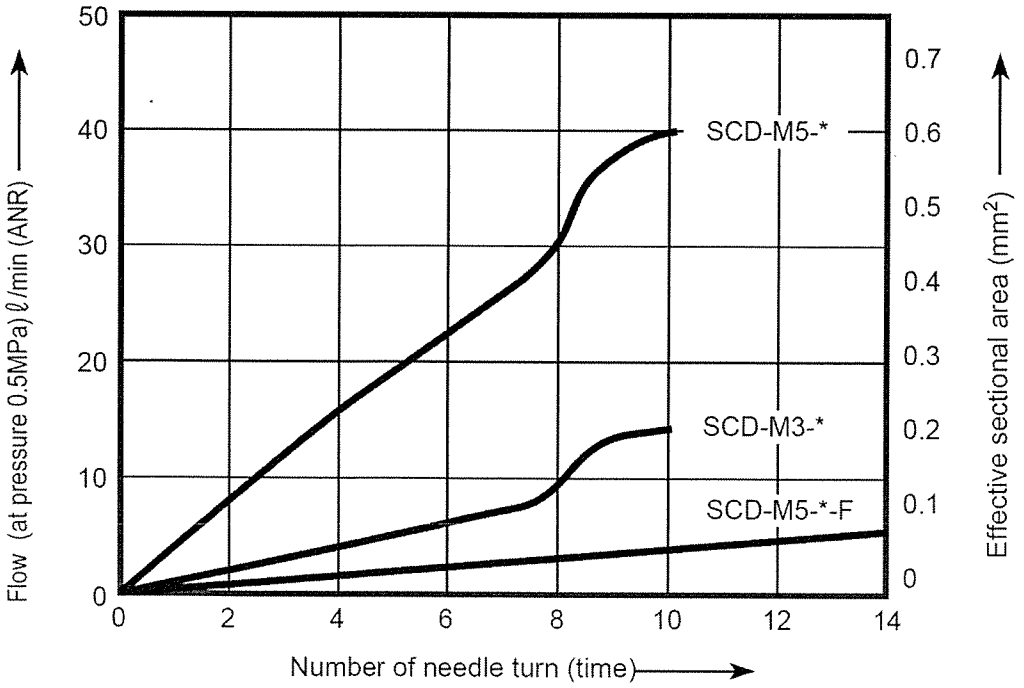
1. PRODUCT

1. 1 Specification

Model / Descriptions	SCD-M3-S	SCD-M3-A	SCD-M5-S	SCD-M5-A	SCD-M5-S-F	SCD-M5-A-F
Working fluid	Compressed air					
Max. working pressure MPa	0.7					
Min. working pressure MPa	0.1					
Withstanding pressure MPa	1.05					
Fluid temperature ℃	5 to 60(no freezing) Note 1					
Ambient temperature ℃	0 to 60 (no freezing)					
Port size	M3×0.5		M5×0.8			
Applicable cylinder bore size mm	Φ4 to φ8		φ6 to φ25			
Number of needle turn	10				14	
Product weight g	3.1	3.9	10	11.7	10.8	12.5
Control flow L/min.(ANR) Note2	13		37		6.7	
Effective sectional area mm²	0.2		0.55		0.1	

Note 1 : Freezing Could occur by adiabatic expansion depending on air quality (dew point)
Note 2 : Flow rate is the atmospheric pressure conversion value at pressure 0.5MPa

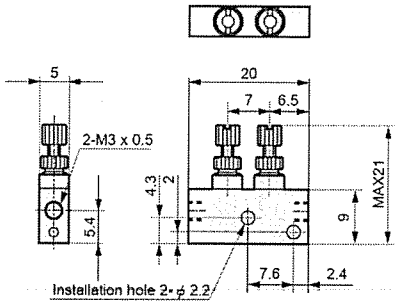
1. 2 Flow characteristics



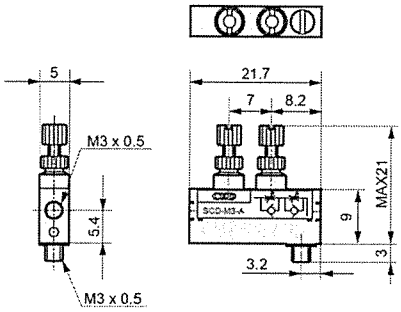
1. 3 Dimensions/Internal structure

1) Dimensions

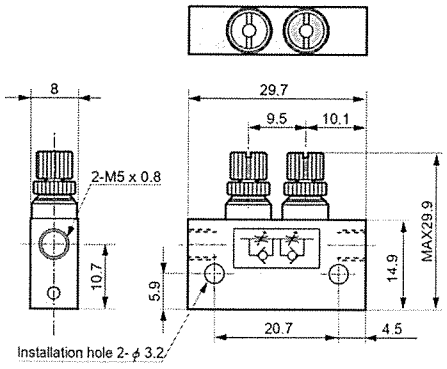
●SCD－M3－S(straight)



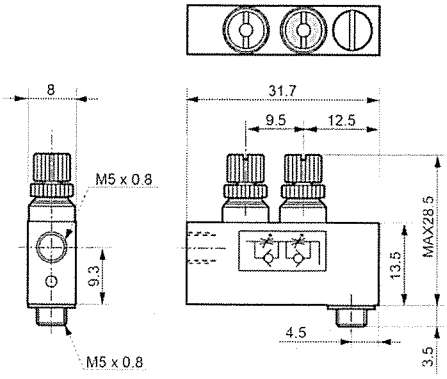
●SCD－M3－A(adjustable)



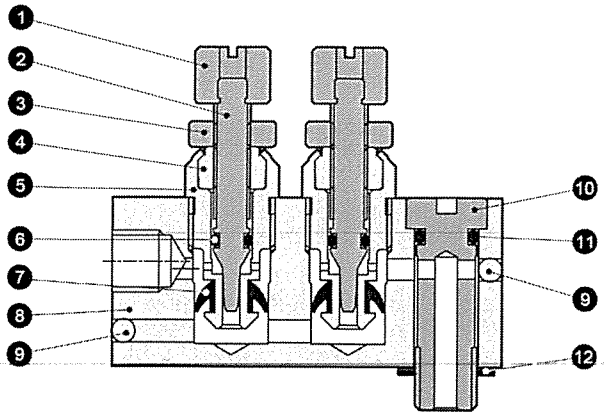
●SCD－M5－S(straight)



●SCD－M5－A(adjustable)



2) Internal structure and parts list

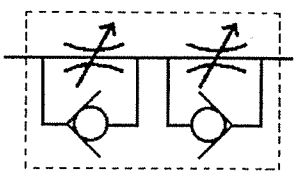


No.	Parts name	Material
1	Knob	Aluminum alloy
2	Needle	Stainless steel
3	Lock nut	Aluminum alloy
4	Needle guide	Aluminum alloy (Stainless steel for fine speed type)
5	Check bracket	Aluminum alloy
6	O ring	Nitrile rubber
7	Packing seal	Hydrogen nitrile rubber
8	Body	Aluminum alloy
9	Steel ball	Stainless steel
10	Bolt	Brass
11	O ring	Nitrile rubber
12	Gasket	Steel + nitrile rubber

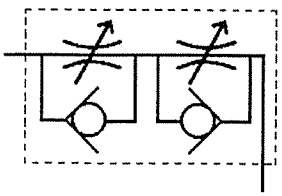
Note 1: For outside of handle, one side is painted with black.
(For adjustable type, black indicates meter in side)
Note 2: Same materials are used for straight type (without ⑩⑪⑫).
Note 3: Brass parts are plated with electroless nickeling.

3) JIS symbol

SCD-M※-S

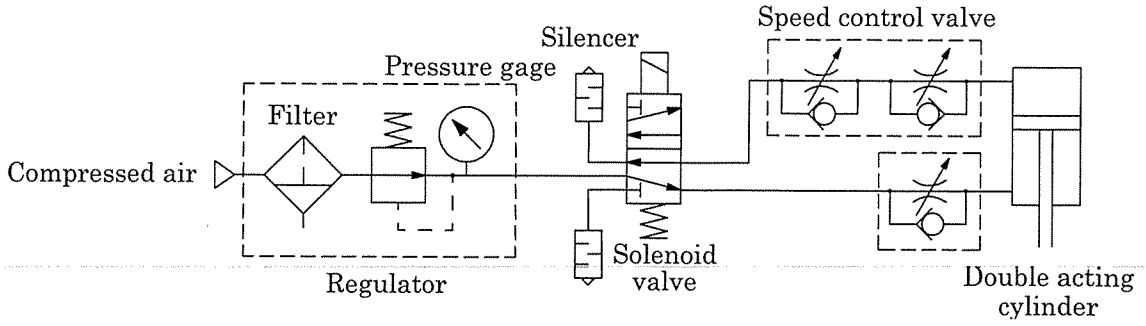


SCD-M※-A

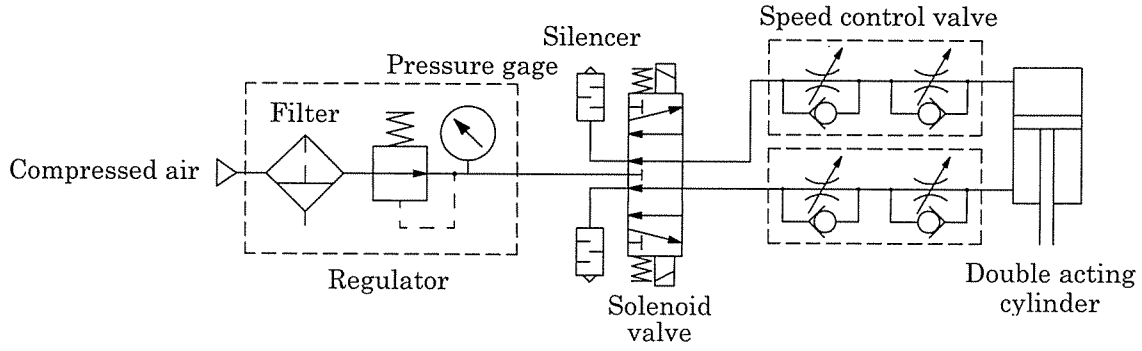


1. 4 Fundamental circuit diagram

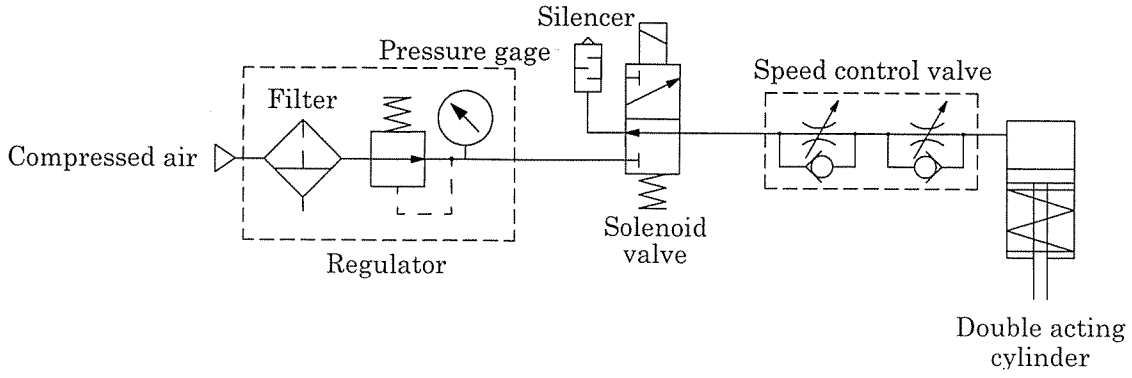
Example of preventive circuit against jumping out on PUSH side at fine speed drive



Example of preventive circuit against jumping out at initial action after residual pressure discharge inside cylinder



Example of reciprocal speed control circuit for single acting cylinder



2. OPERATION

Setting the cylinder speed

Turning the knob ①② clockwise reduces the speed of cylinder, finally closing the control valve, while turning it counterclockwise increases the speed of cylinder.

1) < Example of speed adjustment of preventive circuit against jumping out:

Prevention against jumping out upon cylinder push >

Before adding pressure, fully close the meter-out knobs (①and④) and fully open the meter-in knob②.

Speed adjustment on push side

(1) Turn knob④ counterclockwise up to the necessary cylinder speed.

(2) Turn knob② clockwise to throttle the suction flow rate until jumping out at the push is eliminated.

(3) If the cylinder speed is reduced during adjustment in step (2), turn knob④ to adjust the speed again.

Adjustment of speed on pull side

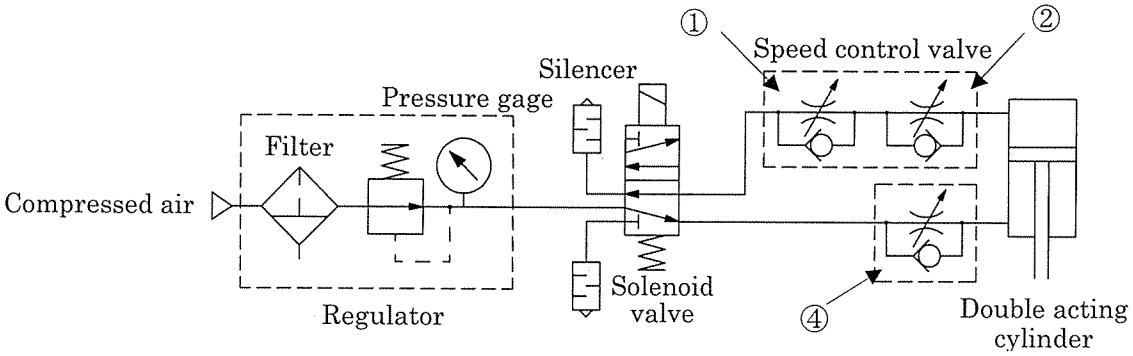
Turn knob① to adjust.

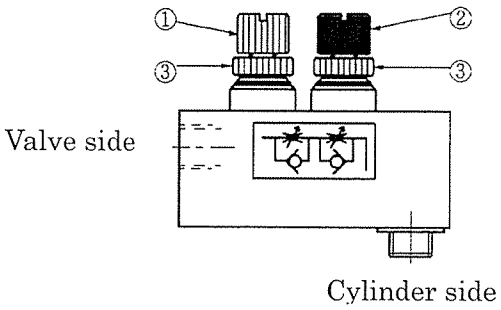
After the cylinder speed is adjusted, do not fail to tighten the lock nut.

<CAUTION>

If cylinder jumping out before adjustment gives ill effects on devices, reduce the flow rate with knob② in advance before adjusting the speed.

(speed adjustment of preventive circuit against jumping out)





< Speed adjustment of single acting cylinder >

Before adding pressure, turn the knob clockwise to fully close. Use the knob specified in the table, according to the cylinder type and controlling direction, to adjust the speed. After adjusting the cylinder speed, do not fail to tighten the lock nut ③.

	Speed adjustment on push side	Speed adjustment on pull side
Pushing cylinder	Knob ②	Knob ①
Pulling cylinder	Knob ①	Knob ②

3. SAFETY PRECAUTIONS

⚠ WARNING :

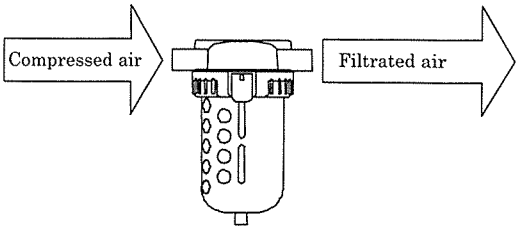
1) Always use this product within its specifications.
2) The product is designed only for compressed air. Do not flow other media into this product.
3) Before starting the maintenance work, stop the air flow completely and make sure that no residual pressure remains inside the product.
4) When installing this product, always observe the flow direction. If the product is installed in the incorrect orientation, the speed cannot be controlled, causing the actuator to be projected.

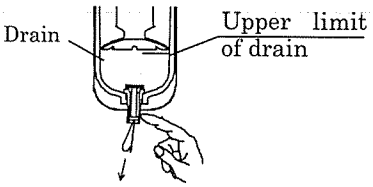
1) Confirm that the product will withstand the working environment.
This product cannot be used in environments where functional obstacles could occuer.
Such environments include high temperatures, a chemical atmosphere, or where chemicals, vibration, moisture, water drip, or gas are present, or where ozone is generated.
2) This valve can not be used as a stop valve that has no leakage. Slight leakage is allowed in product specifications.
3) Check that lock nuts are not loose.
4) Fully close the needle, and open to adjust speed.
If the needle is opened, the actuator could pop out suddenly and pose a hazard.
5) When knob is fully closed, the contact portion of the needle air leakage. Take care to tighten the knob lightly.
6) The needle valve has dislocation prevention that could break if the needle is turned too far. Check the number of turns for the product used.

4. INSTALLATION

4. 1 Fluid

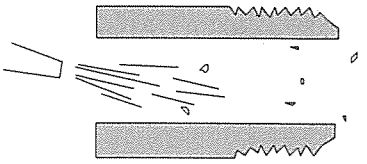
1) Use the compressed air, filtrated and dehumidified. Carefully select a filter of an adequate filtration rate (5μm or lower preferred), flow rate and its mounting location (asclosest to directional control valve as possible)
2) Be sure to drain out the accumulation in filter periodically.
3) Note that the intrusion of carbide of compressor oil (such as carbon or tarry substance) into the circuit causes malfunction of solenoid valve and cylinder. Be sure to carry out thorough inspection and maintenance of compressor.





4. 2 Piping

1) For piping beyond the filter, use pipes that hardly get corroded such as galvanized pipes, nylon tubes, rubber tubes,etc. (Refer to Selection Guide Table for Related Equipment.)
2) See to it that the pipe connecting cylinder and solenoid valve has effective sectional area needed for the cylinder to drive at specified speed.
(Refer to Selection Guide Table for Related Equipment.)



3) Install filter preferably adjacent upper-stream to solenoid valve for eliminating rust,foreign substance and drain in the pipe.
4) Flush air into the pipe to blow out foreign substances and chips before piping.
5) Pipe so that piping connections do not become dislocated due to device movement, vibration, etc.
6) After completing the piping, do not apply a high pneumatic pressure suddenly but gradually increase the pressure of compressed air.
7) After completing the piping, check each speed controller in the piping system for air leakage before supplying compressed air.
8) Tighten to the correct torque when connecting pipes.

Connected screw	Tightening torque (N·m)
M3	0.3～0.6
M5	1.0～1.5

5. MAINTENANCE

5. 1 Trouble shooting

Malfunction	Cause	Remedies
Cylinder speed cannot be changed even though the knob is adjusted.	1. Pipes are connected in the incorrect direction.	Check the marks showing the compressed air flow direction.
	2. Dust is caught in the speed controller.	Flush the air from both ports alternately to blow out the dust.

6. HOW TO ORDER

SCD – (M5) – (S) – (F)
①　②　③

① Port size		② Shape		③ Flow characteristics	
M3	M3×0.5	S	Straight	Blank	Standard type
M5	M5×0.8	A	Adjustable	F	Fine speed type (only M5)

Note 1 :For fine speed type , outside of lock nut is painted with blue .