CKD

SM－195407－A

INSTRUCTION MANUAL

MINIATURE SPEED CONTROL VALVE

SC — M3 / M5 —S,L,F,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.

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.

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SC-M3・M5 series
Miniature speed control valve
Manual No. SM-195407-A

Feb. 15. 2012

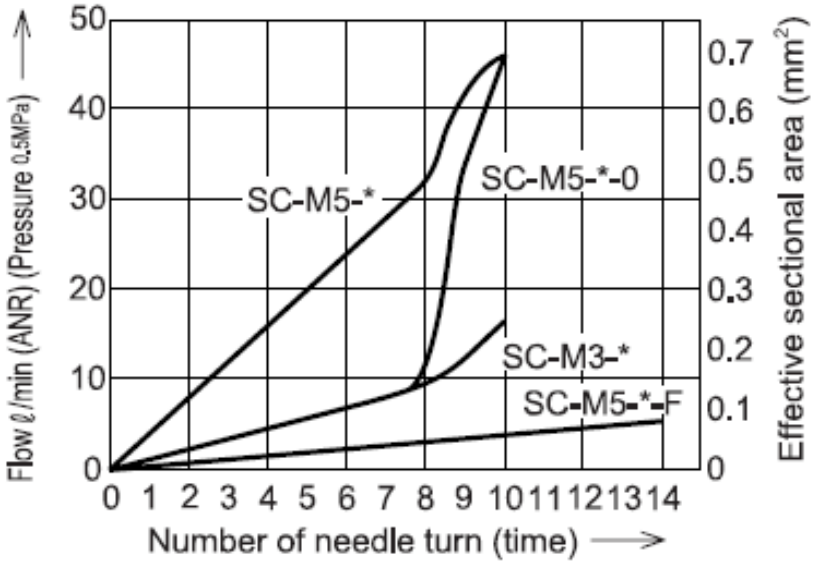
1. PRODUCT

1. 1 Specification

Model / Descriptions		SC-M3-S	SC-M3-L	SC-M3-F	SC-M3-A	SC-M5-S	SC-M5-L	SC-M5-F	SC-M5-A
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				M5			
Product weight	g	1.7	1.5	2.4	2.4	5.6[6]	4.8[5.2]	7.9[8.3]	8.5[8.9]
Applicable cylinder bore size	mm	φ2.5 to φ10				φ6 to φ25			
Number of needle turn		10				10[14]			
Free flow	Flow Note2 L/min.(ANR)	20				53			
	Effective sectional area mm²	0.3				0.8			
Controlled flow	Flow Note2 L/min.(ANR)	16				47[6.7]			
	Effective sectional area mm²	0.25				0.7[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
Value in [ ] is for fine speed type .

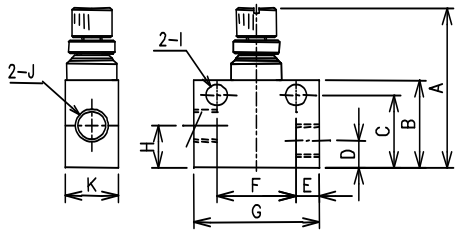
1. 2 Flow characteristics



1．3 Dimensions/Internal structure

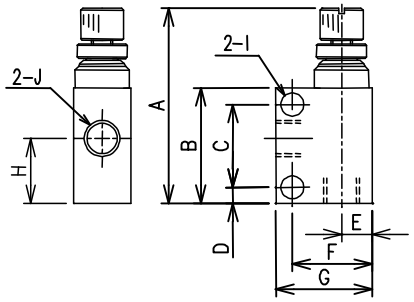
1) Dimensions

●SC－$\begin{matrix}\text{M3}\\\text{M5}\end{matrix}$－S(straight)



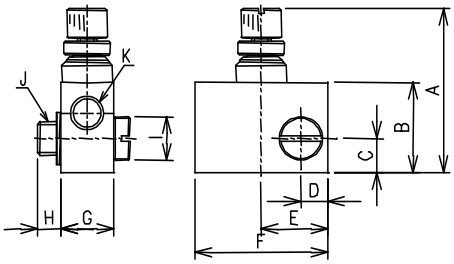
Model no.	A	B	C	D	E	F	G	H	I	J	K
SC-M3-S	18.5(max21)	9	7.3	2.5	2.5	8	13	4.2	φ2.2	M3×0.5	5
SC-M5-S	25(max28.5)	13.5	11.2	4.2	3.5	12	19	6.5	φ3.2	M5×0.8	8

●SC－$\begin{matrix}\text{M3}\\\text{M5}\end{matrix}$－L(elbow)



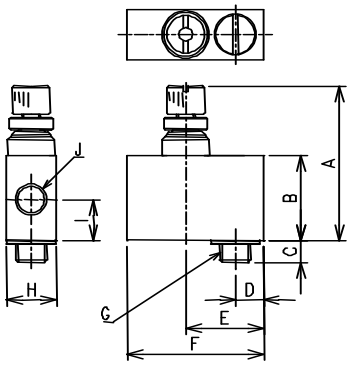
Model no.	A	B	C	D	E	F	G	H	I	J
SC-M3-L	20.3(max22.8)	10.8	7	1.9	2.5	6.5	9	5.7	φ2.2	M3×0.5
SC-M5-L	27.5(max31)	16	11.5	2.2	4.3	11.2	13.5	9	φ3.2	M5×0.8

●SC－$\begin{matrix}\text{M3}\\\text{M5}\end{matrix}$－F(flat)



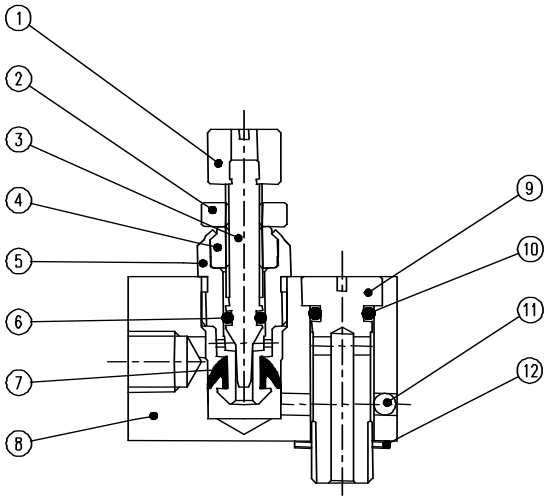
Model no.	A	B	C	D	E	F	G	H	I	J･K
SC-M3-F	18.5(max21)	9	3.4	2.7	6.5	13	5	3	4.2	M3×0.5
SC-M5-F	25(max28.5)	13.5	5.1	4	10.5	20	8	3.5	6.5	M5×0.8

●SC－$\begin{matrix}\text{M3}\\\text{M5}\end{matrix}$－A(adjustable)



Model no.	A	B	C	D	E	F	G	H	I	J
SC-M3-A	18.5(max21)	9	3	3.2	8	14.5	M3×0.5	5	4.2	M3×0.5
SC-M5-A	25(max28.5)	13.5	3.5	4.5	12.5	22	M5×0.8	8	6.5	M5×0.8

2) Internal structure and parts list

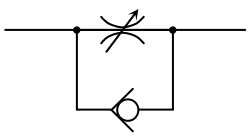


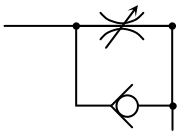
No.	Parts name	Material
①	Knob	Aluminum alloy
②	Lock nut	Aluminum alloy
③	Needle	Stainless steel
④	Needle guide	Aluminum alloy
⑤	Check bracket	Aluminum alloy [Stainless steel]
⑥	O ring	Nitrile rubber
⑦	Packing seal	Hydrogen nitrile rubber
⑧	Body	Aluminum alloy
⑨	Bolt	Copper alloy
⑩	O ring	Nitrile rubber
⑪	Steel ball	Stainless steel
⑫	Gasket	Steel, Nitrile rubber

Value in [ ] is for fine speed type

3) JIS symbol

SC-M※-S　　SC-M※-L
SC-M※-F　　SC-M※-A

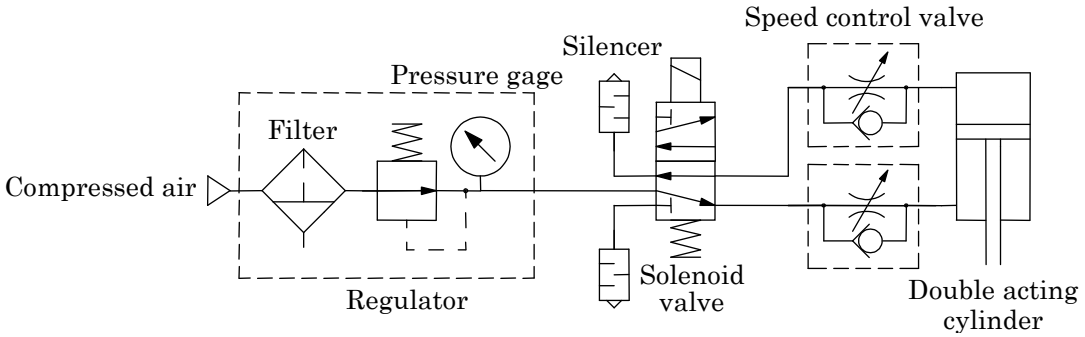




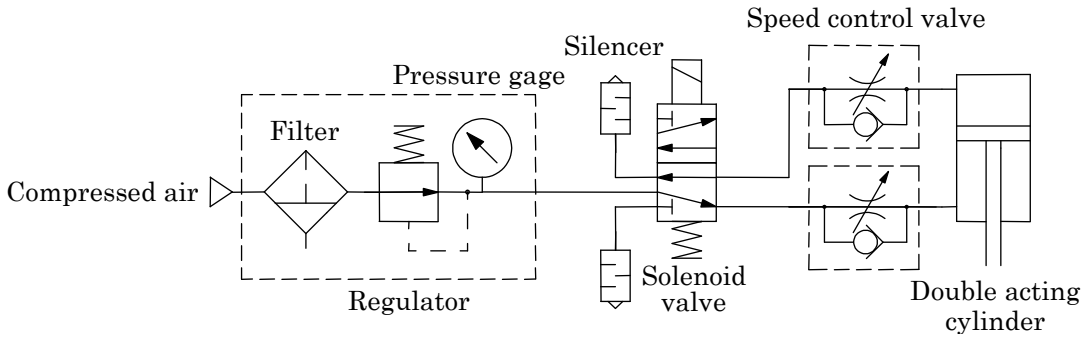
1．4 Fundamental circuit diagram

The fundamental circuit diagram or speed control valve is as per shown below.

1)Meter-out connection

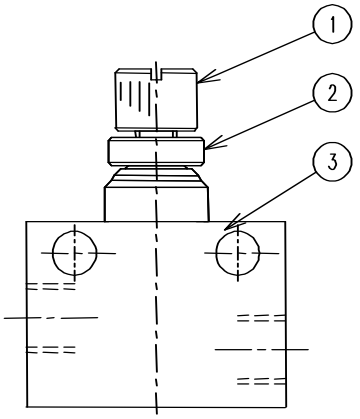


2)Meter-in connection



2. OPERATION

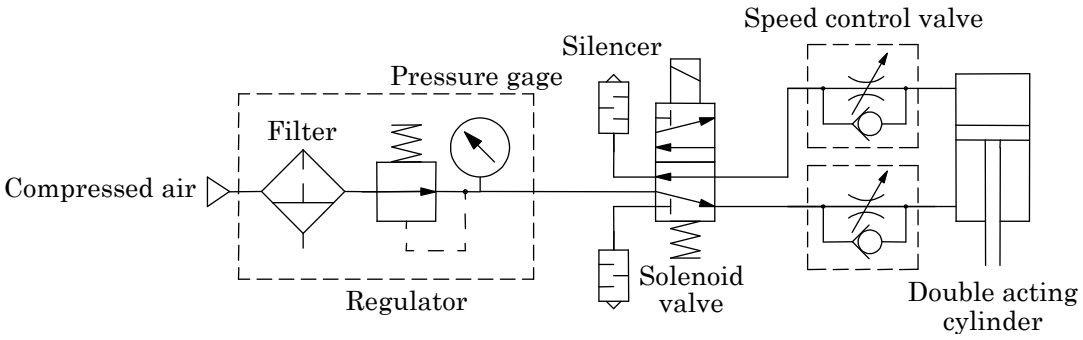
Setting the cylinder speed



Turning the knob ① clockwise reduces the speed of cylinder, finally closing the control valve, while turning it counterclockwise increases the speed of cylinder. To build a meter out circuit, close the control valve first by turning its knob ① clockwise, then connect it to the piping so that the casted JIS symbol on the body ③ matches with the direction of flow as per designed schematic.

While giving pressure to the circuit, turn the knob ① of control valve counterclockwise until the required speed of the cylinder is set. Once the position of the knob ① is set, make sure to tighten up the lock nut ②.

(Meter-out connection)



2
CAUTION

3. SAFETY PRECAUTIONS

⚠ WARNING :

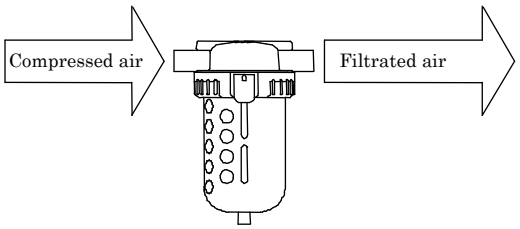
1) Always use this product within its specifications.
2) The product is designed only for compressed air. Do not flow other media into this product.
3) Before starting the maintenance work, stop the air flow completely and make sure that no residual pressure remains inside the product.
4) When installing 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.

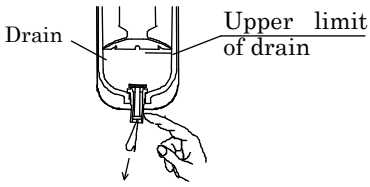
1) Confirm that the product will withstand the working environment.
This product cannot be used in environments where functional obstacles could occuer.
Such environments include high temperatures, a chemical atmosphere, or where chemicals, vibration, moisture, water drip, or gas are present, or where 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

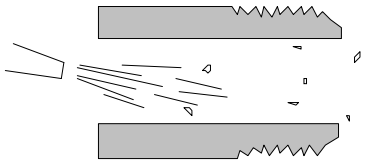
1) Use the compressed air, filtrated and dehumidified. Carefully select a filter of an adequate filtration rate (5μm or lower preferred), flow rate and its mounting location (asclosest to directional control valve as possible)
2) Be sure to drain out the accumulation in filter periodically.
3) Note that 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.

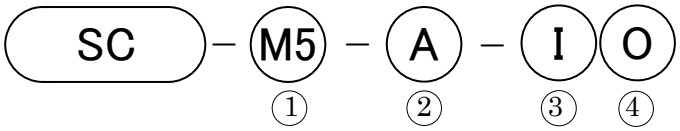
Connected screw	Tightening torque(N･m)
M3	0.3～0.6
M5	1.0～1.5

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



① Port size		② Shape		③ Control method		④ Flow characteristics	
M3	M3×0.5	S	Straight	Blank	Meter-out type	Blank	Standard type
M5	M5×0.8	L	Elbow	I	Meter-in type	O	Low speed type (only M5)
		F	Flat			F	Fine speed type (only M5)
		A	Adjustable				

Model no. of SC-*-S-I can not be selected . Install SC-*-S with reversing IN and OUT side.