CKD

SM－437655－A／3

INSTRUCTION MANUAL

SPEED CONTROL VALVE WITH ADJUSTING DIAL

DSC

- 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.

3rd

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.

⚠ WARNIN

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, 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.

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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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DSC series

Speed control valve with adjusting dial

Manual No. SM－437655－A／3

Issued : Apr 24, 2012
Revision : Nov 02, 2018

1. PRODUCT

1.1 Specification

● Compact

Descriptions			DSC-C-M5			DSC-C-6		
Compatible tube O.D.		mm	φ3.2	φ4	φ6	φ4	φ6	φ8
Port size			M5			R1/8		
Working fluid			Compressed air					
Max. working pressure		MPa	1.0 (≈150 psi, 10 bar)					
Min. working pressure		MPa	0.05 (≈7.3 psi, 0.5 bar)					
Proof pressure		MPa	1.5 (≈220 psi, 15 bar)					
Fluid temperature		°C	5 (41°F) to 60 (140°F) (no freezing. *2)					
Ambient temperature		°C	0 (32°F) to 60 (140°F) (no freezing)					
Needle control range			1 to 7 rotations					
Weight		g	10.5	11.5	12	22	23	24
Free flow	Flow rate	ℓ/min(ANR)	87	100		210	270	
	Eff. X-sectional area	mm^2	1.3	1.5		3.2	4	
Controlled flow (Standard flow rate)	Flow rate	ℓ/min(ANR)	60			160	200	
	Eff. X-sectional area	mm^2	0.9			2.4	3	
Controlled flow (Low flow rate)	Flow rate	ℓ/min(ANR)	20			60		
	Eff. X-sectional area	mm^2	0.3			0.9		
Controlled flow (fine flow rate)	Flow rate	ℓ/min(ANR)	-	6.7		13		-
	Eff. X-sectional area	mm^2	-	0.1		0.2		-

● Standard

Descriptions			DSC-6			DSC-8			DSC-10				DSC-15	
Compatible tube O.D.		mm	φ4	φ6	φ8	φ6	φ8	φ10	φ6	φ8	φ10	φ12	φ10	φ12
Port size			R1/8			R1/4			R3/8				R1/2	
Working fluid			Compressed air											
Max. working pressure		MPa	1.0 (≈150 psi, 10 bar)											
Min. working pressure		MPa	0.05 (≈7.3 psi, 0.5 bar)											
Proof pressure		MPa	1.5 (≈220 psi, 15 bar)											
Fluid temperature		°C	5 (41°F) to 60 (140°F) (no freezing. *2)											
Ambient temperature		°C	0 (32°F) to 60 (140°F) (no freezing)											
Needle control range			1 to 10 rotations											
Weight		g	33	34	35	45	46	48	60	61	64	65	95	97
Free flow	Flow rate	ℓ/min(ANR)	210	270		470	530		670	1000	1070		1470	1600
	Eff. X-sectional area	mm^2	3.2	4		7	8		10	15	16		22	24
Controlled flow (Standard flow rate)	Flow rate	ℓ/min(ANR)	160	200		320	400		400	700	800		1120	1200
	Eff. X-sectional area	mm^2	2.4	3		5	6		6	10.5	12		17	17.5
Controlled flow (Low flow rate)	Flow rate	ℓ/min(ANR)	60			130			270				400	
	Eff. X-sectional area	mm^2	0.9			2			4				6	

*1: Flow rate is the atmospheric pressure conversion value at pressure 0.5 MPa.
*2: Freezing may occur due to adiabatic expansion depending on the air quality (dew point).

Specifications for rechargeable battery

● Structure suitable for use in general assembly during the rechargeable battery manufacturing process.

DSC - ..... - P4

Clean-room specifications

● Anti-dust generation structure for use in clean rooms.

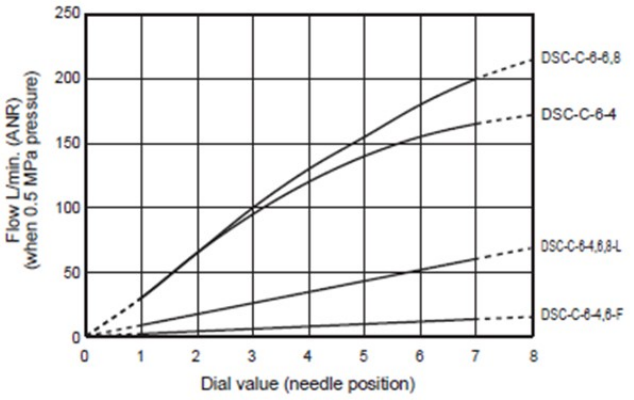
DSC - ..... - P70

1.2 Flow characteristics

● Compact type

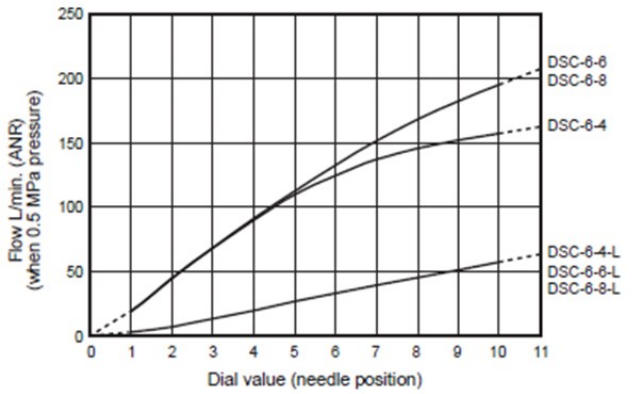
● DSC-C-M5-*

● DSC-C-6-*

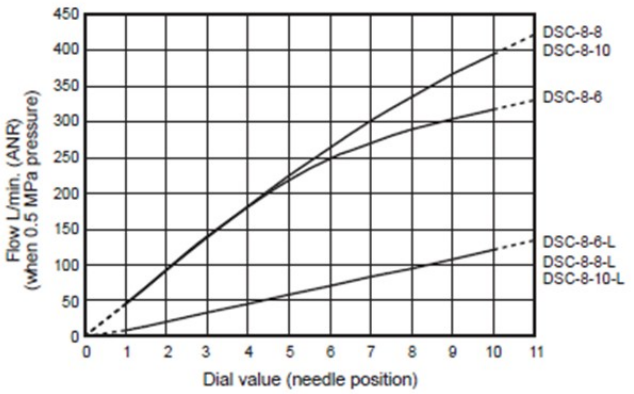


● Standard type

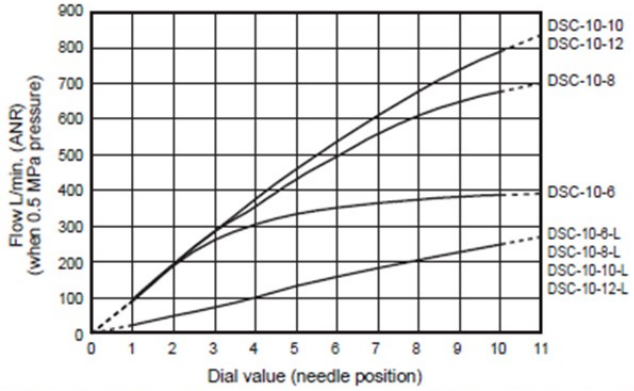
●DSC-6-*



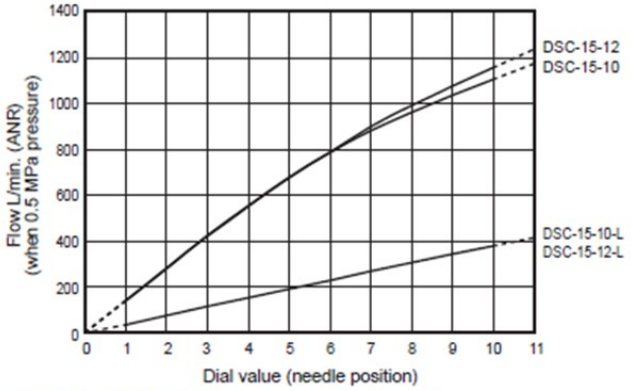
●DSC-8-*



●DSC-10-*



●DSC-15-*

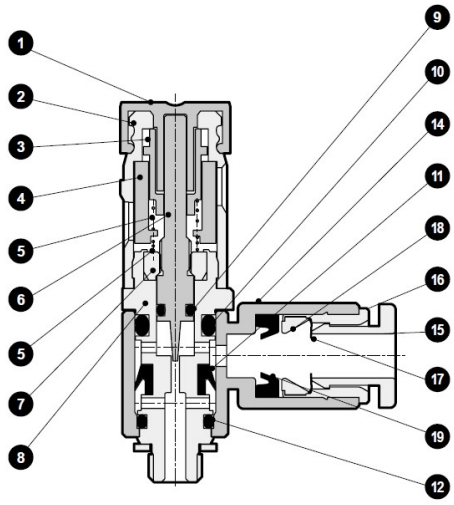


Note: Flow characteristics will vary based on pipe conditions and temperature changes before and after, and therefore caution is advised.

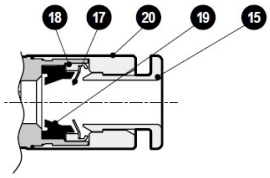
1.3 Internal structure and part list

● Compact

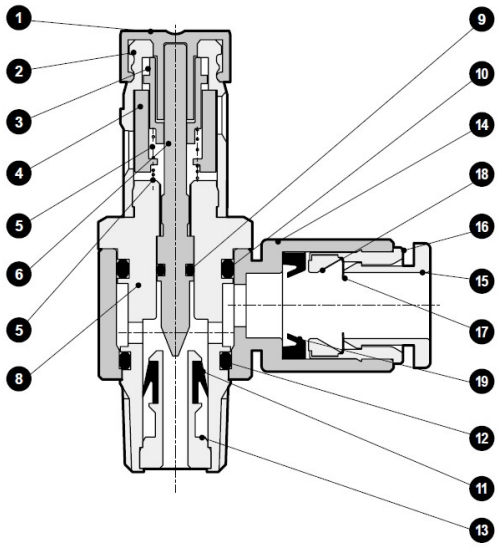
●DSC-C-M5-4,6



●DSC-C-M5-3



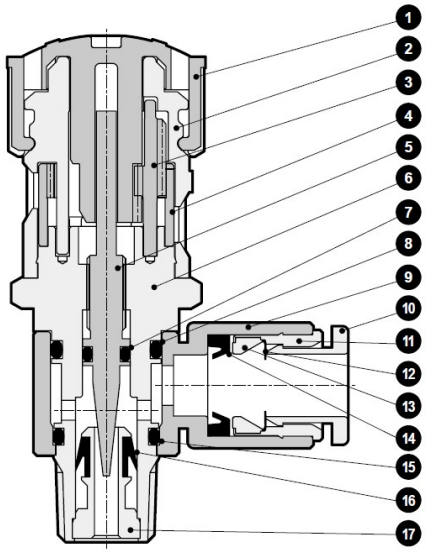
●DSC-C-6-*



No.	Part name	Material	No.	Part name	Material
1	Knob	Polyacetal	11	Packing	Hydrogenated nitrile rubber
2	Gear cover	Polybutylene terephthalate	12	O-ring	Nitrile rubber
3	Slide gear	Polybutylene terephthalate	13	Check part	Copper alloy
4	Indication ring	Polybutylene terephthalate	14	Rotor	Polybutylene terephthalate
5	Spring	Stainless steel	15	Push ring	Polybutylene terephthalate
6	Needle	Stainless steel	16	Outer ring	Copper alloy
7	Gland nut	Copper alloy	17	Chuck	Stainless steel
8	Rotary shaft	Copper alloy	18	Chuck holder	Polyethersulfone (Copper alloy) *1
9	O-ring	Nitrile rubber	19	Packing	Nitrile rubber
10	O-ring	Nitrile rubber	20	Fitting body	Copper alloy

*1: Values shown in ( ) are when DSC-C-M5-3 is selected
*2: All the copper alloy parts have electroless nickel plating.

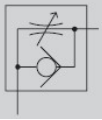
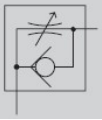
● Standard



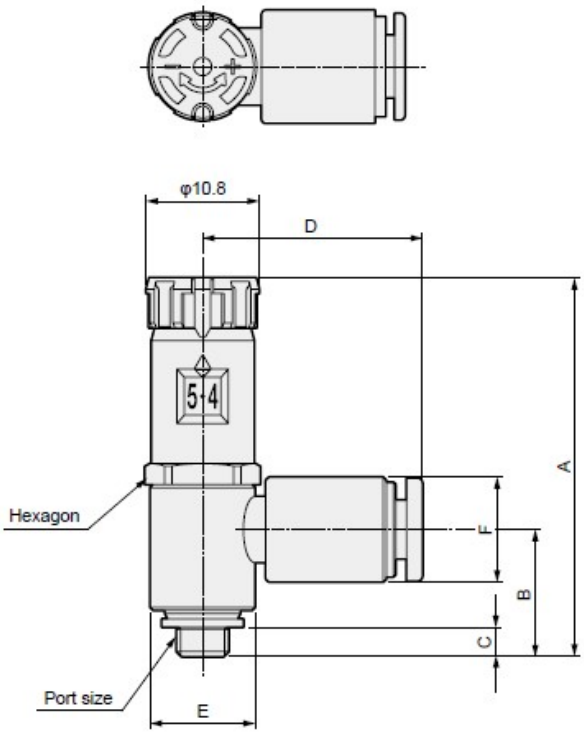
No.	Part name	Material
1	Knob	Polyacetal
2	Gear cover	Polybutylene terephthalate
3	Gear	Stainless steel
4	Indication ring	Polyacetal
5	Needle	Stainless steel
6	Rotary shaft	Copper alloy
7	O-ring	Nitrile rubber
8	O-ring	Nitrile rubber
9	Rotor	Polybutylene terephthalate
10	Push ring	Polybutylene terephthalate
11	Outer ring	Copper alloy
12	Chuck	Stainless steel
13	Chuck holder	Polyethersulfone
14	Packing	Nitrile rubber
15	O-ring	Nitrile rubber
16	Packing	Hydrogenated nitrile rubber
17	Check part	Copper alloy

*1: All the copper alloy parts have electroless nickel plating.

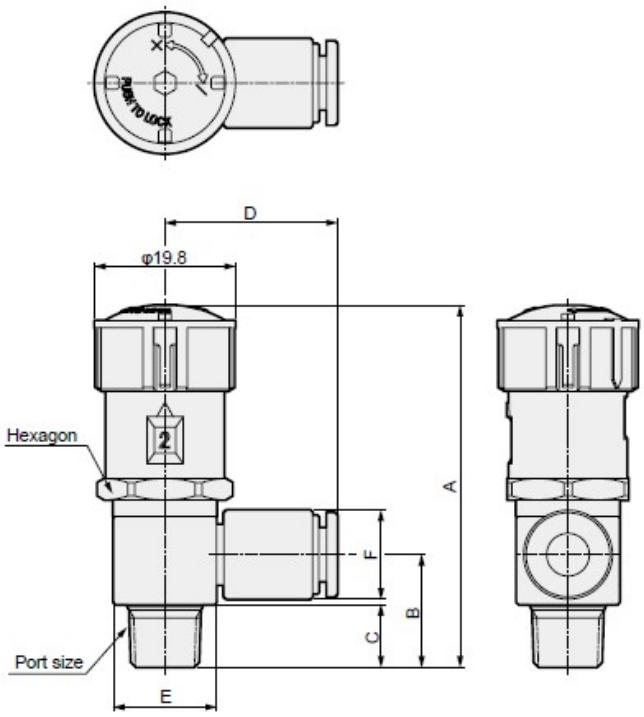
1.4 Envelope dimensions and JIS symbol

JIS symbol  (Meter-out)  (Meter-in)

● Compact



● Standard

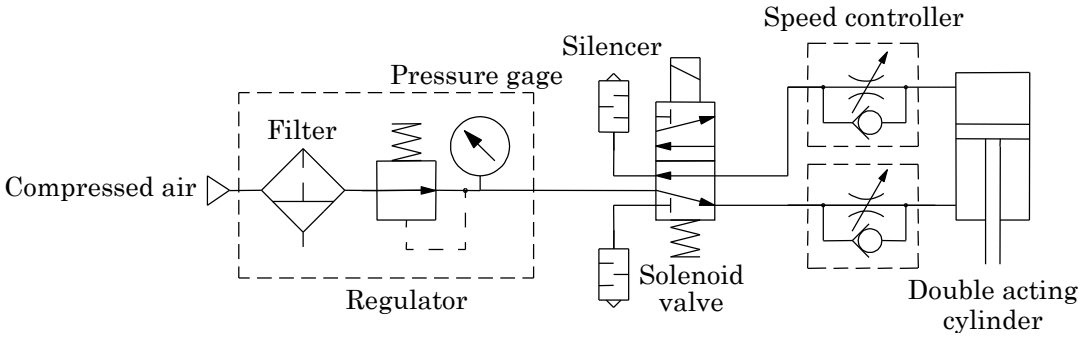


Model No.	Product size	Port size	Compatible tube O.D.	A		B	C	D	E	F	Hexagon
				When locked	At adjustment						
DSC-C-M5-3	Compact Type	M5×0.8	φ3.2	36	37.5	11.9	3	16.5	10	7.5	10
DSC-C-M5-4			φ4			11.9		21		10	
DSC-C-M5-6			φ6			11.7		22.5		12.5	
DSC-C-6-4		R1/8	φ4	41.9	43.4	16.2	8.7	23.5	14.5	10	13
DSC-C-6-6			φ6			15.7		24.5		12.5	
DSC-C-6-8			φ8			15.4		26		14.5	
DSC-6-4	Standard Type	R1/8	φ4	51	54	16.2	8.7	23.5	14.5	10	17
DSC-6-6			φ6			15.7		24.5		12.5	
DSC-6-8			φ8			15.4		26		14.5	
DSC-8-6		R1/4	φ6	55.5	58.5	20	11.7	26	18	12.5	17
DSC-8-8			φ8			19		27.5		14.5	
DSC-8-10			φ10			19		30.5		17.5	
DSC-10-6		R3/8	φ6	58	61	23.1	12.7	28.5	22.5	12.5	19
DSC-10-8			φ8			21.3		30		14.5	
DSC-10-10			φ10			21.8		32		17.5	
DSC-10-12			φ12			21.7		33.5		20	
DSC-15-10		R1/2	φ10	63	66	25.2	15.7	34.5	27.5	17.5	24
DSC-15-12			φ12			25.7		36		20	

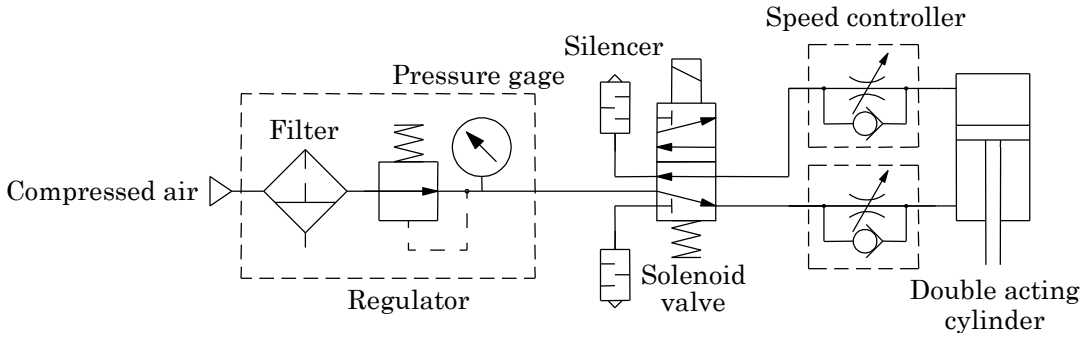
1.5 Fundamental circuit diagram

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

1) Meter-out connection



2) Meter-in connection



2. SAFETY PRECAUTIONS FOR INSTALLATION AND REPLACEMENT

⚠ WARNING :

1) Always use the product under the specified conditions.
2) Before starting the maintenance work, stop the air flow completely and make sure that no residual pressure remains inside the product.
3) When connecting a tube to the joint, insert the tube firmly until it makes contact with the tube end piece of the joint. Make sure that the tube will not come out of the joint before running the system.
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.
5) To control the speed, gradually open the needle valve starting from the fully closed position. Turn the needle clockwise to close the valve; counter-clockwise to open.

3. CAUTION

Design & Selection

⚠ CAUTION

■ This valve can not be used as a stop valve that has no leakage.
Due to structure, a few leakage could occur.

■ Care must be taken because the flow varies from the characteristics value on page 3 depending on the piping conditions before or after the product and temperature.

■ Do not use this valve in circuits where ozone is generated intentionally.
Ozone resistance is sufficient for naturally generated ambient ozone. Packing deteriorates if ozone levels are high.

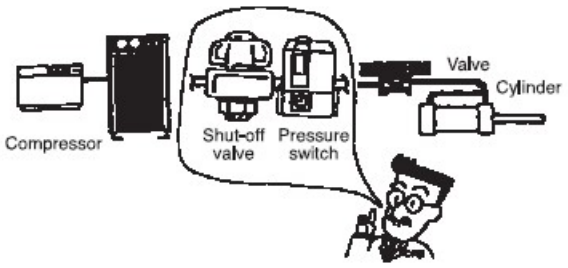
■ This product is used with compressed air. Avoid use in other fluids.

■ Use this product in accordance with the specifications range.
Consult with CKD when using the product outside specifications or for special applications.
- Use with exceeding the specifications range may result in insufficient performance, and safety can not be secured.
- This product could not use in special applications and environment.
For example, use for special applications including nuclear energy, railway, aircraft, marine vessel, 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.

■ Confirm that the product will withstand the working environment.
- This product cannot be used in environments where functional obstacles could occur.
Special environments reaching high temperatures, having chemical atmospheres, or having chemicals, vibration, humidity, moisture, dripping, or gas are present. Environments where ozone is generated.
- Do not use the product in the place that the product could directly contact with coolant or spatter, etc.., ,

■ Understand compressed air features before designing a pneumatic circuit.
- The same functions as mechanical, hydraulic, and electrical methods cannot be anticipated if instantaneous service interruption and holding are required during an emergency stop.
- Pop-out, air discharge, or leakage due to air compression and expansion could occur.

■ Install the pressure switch and " the shut-off valve " compressed air inlet side of a device.
- The pressure switch will disable operation until set pressure is reached.The shut-off valve will exhaust compressed air in the pneumatic pressure circuit, and will prevent accidents caused by operation of pneumatic components by residual pressure.



■ Confirm that PTFE can be used. The sealant contains PTFE (polytetrafluoroethylene resin) powder. Check that this poses no problem during use.

■ Indicate the maintenance conditions in the device's instruction manual.
- The product's function can drop markedly with working status, working environment, and maintenance, and can prevent safety from being attained.With correct maintenance, the product functions can be used to the fullest.

■ Use in the ultra dry air is short service life deppending on the deterioration of the rubber part.

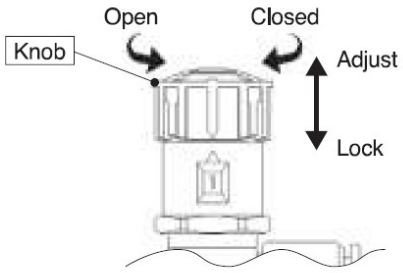
■ Do not continue pushing or give load to the push ring of push-in joint.
- There is a possibility that tube is not able to grip.
- Note not to continue pushing the push ring , during transport with product assembly.

Installation & Adjustment

⚠ CAUTION

■ The needle lock is released when the knob is pulled, and is locked when pressed.

■ The clockwise rotation makes the flow open and the counterclockwise rotation makes the flow close.



■ After adjusting speed, press the knob and confirm that the needle is locked.

■ Controllable range of the needle is from 1 to 7 or 1 to 10 turns; operate with a maximum of 0.05 N·m torque. Turning the knob beyond the range forcibly may result in distorted flow characteristics or malfunctions.

■ Adjust speed by opening when the needle is nearly closed.

If the needle is open, the actuator could pop out suddenly and cause a hazard.

■ Check flow direction with JIS symbol.

If installed in reverse, speed adjustment will not be applied and the actuator could pop out, creating a hazard.

■ Final speed must be adjusted as necessary.

Speed differs greatly depending on product differences, working conditions, actuator differences, and temperature, so confirm the final speed as necessary.

■ Install an air filter before the circuit.

The flow varies depending on clogging or foreign matters adhered in the orifice.

■ When piping ,tightend the screw with the specified tightening torque (table1-(1)). Do the additional tightening job for the rotation number display location adjustment less than the specified torque(table1-(2)).

To avoid trouble, do not the piping with gripping the knob.

Thread size	(1) Piping (N·m)	(2) Retightening (N·m)
R1/8	3 to 5	9 or less
R1/4	6 to 8	14 or less
R3/8	13 to 15	24 or less
R1/2	16 to 18	30 or less

Tightening torque of port thread (table 1)

■ Securely insert the tube until it contacts the joint's tube end, and check that it does not come off the joint.

■ Do not take the product out of the packing bag until just before piping.

● It foreign matter enters into the pneumatic components internal, then a cause such as a failure and malfunction since a piping port.

■ When connecting pipes, wrap sealing tape in the opposite direction from threads starting 2 mm margin from the end of piping threads.

● If sealing tape protrudes from pipe threads, it could be cut when screwed in. This could cause the tape to enter the pneumatic components and lead to faults.

■ Handling push-in tube joint/tube

● Refer to Cautions of joint and tube, and "Pneumatic,Vacuum and Auxiliary Components" (No.CB-024S) for handling push-in joints and tubes.

■ Always flush just before piping pneumatic component.

● Foreign matter that enters during piping must not enter pneumatic components.

■ When supplying compressed air for the first time after connecting pipes, do not apply high pressure suddenly.

● Tube may come off and fly out, causing an accident.

■ After connecting piping, check pipe connections for air leaks before supplying compressed air.

● Apply a leakage detection agent on pipe connections with a brush, and check for air leaks.

■ Connect piping so that connections are not dislocated by system movement, vibration, or tension.

● Control of actuator speed will be disabled if piping on the exhaust side of the pneumatic circuit is disengaged.
● When using the chuck holding mechanism, the chuck will be released creating a hazardous state.

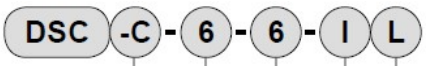
■ Ensure spaces around the pneumatic component for installation, removal, wiring, and piping work.

■ Avoid use in applications involving continuous turning or swaying.

● Otherwise the joint could be damaged.

■ Avoid use in places with high vibration or impact.

4. HOW TO ORDER



Ⓐ Product size

Ⓑ Port size

Ⓒ Compatible tube O.D.

Ⓓ Control method

Ⓔ Flow rate

Code	Content
Ⓐ Product size	
Blank	Standard
-C	Compact
Ⓑ Port size	
M5	M5
6	R1/8
8	R1/4
10	R3/8
15	R1/2
Ⓒ Compatible tube O.D.	
3	φ3.2
4	φ4
6	φ6
8	φ8
10	φ10
12	φ12
Ⓓ Control method	
Blank	Meter-out
I	Meter-in (Push ring color: black)
Ⓔ Flow rate	
Blank	Standard flow rate
L	Low flow rate
F	Fine flow rate (compact only)

Port size - Compatible tube O.D. - flow rate combination

Product size	Compact		Standard			
Port size	M5	R1/8	R1/8	R1/4	R3/8	R1/2
φ3.2	○					
φ4	◎	◎	○			
φ6	◎	◎	○	○	○	
φ8		○	○	○	○	
φ10				○	○	○
φ12					○	○

○: Flow rate "F" (fine flow rate) cannot be selected
◎: Flow rate "F" (fine flow rate) can be selected