CKD

SM-353500-A

INSTRUCTION MANUAL

NEEDLE VALVE

SCL2-N

- 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.

2nd
CKD Corporation

For Safety Use

To use this product safety, basic knowledge of pneumatic equipment, including materials, piping, electrical system and mechanism, is required (ISO 4414 *1 JIS B 8370 *2).

We do not bear any responsibility for accidents caused by any person without such knowledge or arising from improper operation.

Our customers use this product for a very wide range of applications, and we cannot keep track of all of them. Depending on operating conditions, the product may fail to operate to maximum performance, or cause an accident. Thus, before placing an order, examine whether the product meets your application, requirements, and how to use it.

This product incorporates many functions and mechanisms to ensure safety. However, improper operation could result in an accident. To prevent such accidents **read this operation manual carefully for proper operation.**

Observe the cautions on handling described in this manual, as well as the following instructions:

Additionally, the caution is classified into the following three groups, “CAUTION”, “WARNING”, and “DANGER”, to identify the degree of the danger it presents and possible hazard.

⚠DANGER: Failure to pay attention to DANGER notices may cause a situation that results in a fatality or serious injury and that requires urgent addressing.

⚠WARNING: Failure to pay attention to WARNING notices may result in a fatality or serious injury.

⚠CAUTION: Failure to pay attention to WARNING notices may result in injury or damage to equipment or facilities.

*1) ISO 4414 : Pneumatic fluid power ・・・ Recommendations for the application of equipment to transmission and control systems.

*2) JIS B 8370 : General rule for pneumatic systems

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SCL2-N series
Needle Valve

Manual No. SM-353500-A

Dec.20.2004
Revision : Jul.03.2013

1. PRODUCT

1.1 Specification

Model / Item		SCL2-N-04	SCL2-N-06	SCL2-N-08
O.D. of the applied pipes	mm	ϕ4	ϕ6	ϕ6 or ϕ8
Working fluid		Compressed air / N2 Gus		
Max. working pressure	MPa	1.0		
Negative pressure	kPa	-100		
Proof pressure	MPa	1.5		
Fluid temperature	℃	5 to 60 (Not be frozen)		
Ambient temperature	℃	0 to 60 (Not be frozen)		
Weight	g	11.5	16	32
Needle speed rotation		12（Flow rate type: 15 with 010）		

Note: The adiabatic expansion may cause freezing depending on the quality (dew point) of the air.

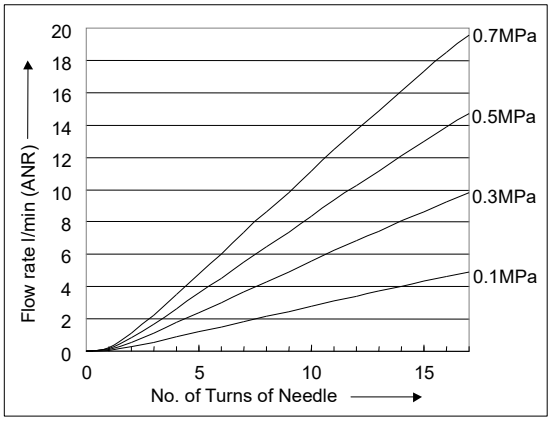
Flow characteristic

Flow rate type code		010	050	150	300
Max. flow (at 0.5MPa)	l/min(ANR)	13	50	150	300
Effective sectional area	mm^2	0.2	0.7	2.2	4.5

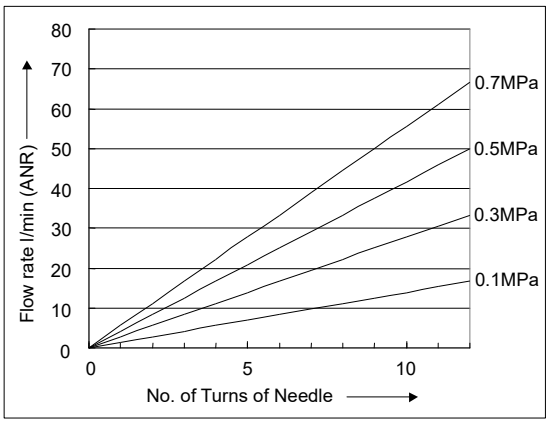
Note: The flow rate atmospheric conversion rate at 0.5MPa.

1.2 Flow characteristic

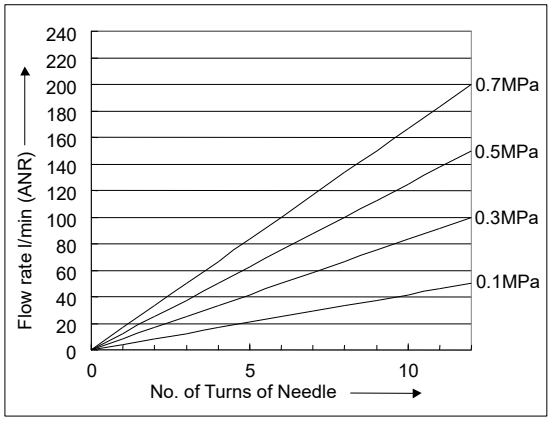
1) Flow rate type: [010]



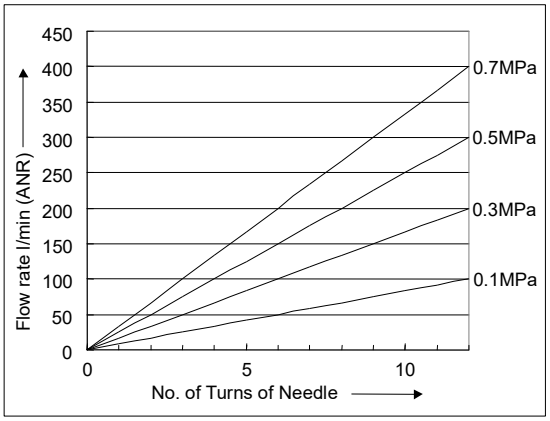
2) Flow rate type: [050]



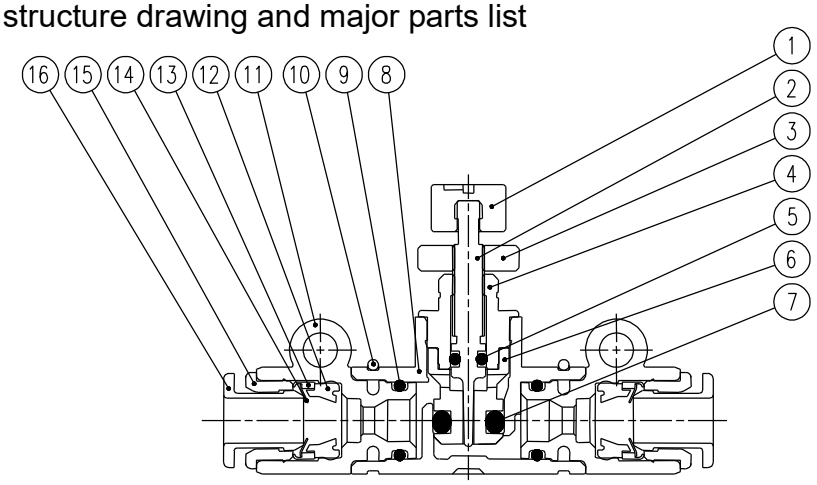
3) Flow rate type: [150]



4) Flow rate type: [300]



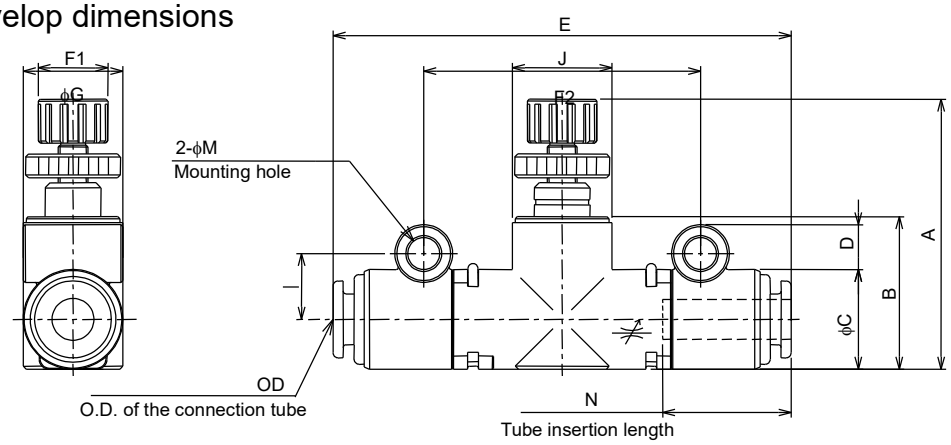
1.3 Internal structure drawing and major parts list



No.	Part name	Material	No.	Part name	Material
1	Knob	Polyethylene terephthalate resin	10	Stopper ring	Stainless steel
2	Needle	Brass	11	Joint case	Polyethylene terephthalate resin
3	Lock nut	Brass	12	Packing	Nitrile rubber
4	Guide ring	Brass	13	Holder	Body size: 04/06…Brass
5	O-ring	Nitrile rubber			Body size: 08/10…Polyethersulfone
6	Check mount	Brass	14	Chuck	Stainless steel
7	O-ring	Nitrile rubber	15	Outer ring	Brass
8	Body	Polyethylene terephthalate resin	16	Push ring	Polyethylene terephthalate resin*
9	O-ring	Nitrile rubber			

* All polyethylene terephthalate is flame retardant resin.
* All brass parts are given electroless nickel plating.
* The material of the clean equipment and oil-free specification "P80" (12) packing is nitrile hydride rubber, and (16) the material of the push ring is polyacetal

1.4 Envelop dimensions



Model code	OD	A		B	C	D	E	F1	F2	G	I	J	M	N
		MIN	MAX											
SCL2-N-04-H44	ϕ4	27.1	31.6	15.3	10	4.5	46	10	11	7	6.6	27.8	3.3	13
SCL2-N-06-H66	ϕ6	28.8	33.3	17.7	12	5.6	49.4	12	12	7	8.1	30.8	4.3	14
SCL2-N-08-H66	ϕ6	38	44.5	22.9	15	5.6	64	15	16	11	9.5	41		18
SCL2-N-08-H88	ϕ8						66.5							19

Note: Dimensions F1 and F2 indicate an oval.

2. SAFETY PRECAUTIONS FOR INSTALLATION AND REPLACEMENT

⚠WARNING:

1) Always use the product under the specified conditions.
2) Before replacing the joint or a tube connected to it, stop the air supply and make sure that no residual pressure is present inside the pneumatic circuit.
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.

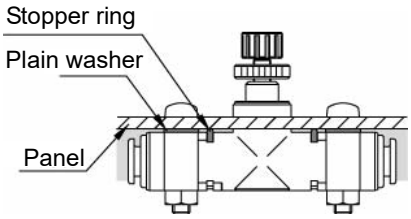
3. CAUTION

3.1 Design and Selection

1) Use this product within the proper specified range.
   Contact CKD when using the product outside specifications or for special applications.
   - If used outside specifications, product functions may not be attained and safety cannot be guaranteed.
   - There are cases when this product cannot be used for special applications or in special environments.
     These include special applications requiring safety including nuclear energy, railroad, aviation, vehicle, and medical devices or applications coming into contact with beverages or food, amusement equipment, emergency shutoff circuits, press machines, brake circuits, and safety devices.
2) Check that the product can withstand the working environment.
   - This product cannot be used in an environment where functional obstacles could occur.
     This includes high temperatures, a chemical atmosphere, or where chemicals, vibration, moisture, water drip or gas are present.
   - Do not use this product where cutting oil, coolant, or spatter could occur.
3) This product cannot be used as a stop valve with zero leakage. Slight leakage is allowed in product specifications.
4) Avoid installing this product outdoors or where it is exposed to direct sunlight.
5) Fully understand characteristics of compressed air before designing the pneumatic circuit.
   - If instantaneous stopping and holding are required during an emergency stop, functions equivalent to mechanical, hydraulic or electrical methods cannot be anticipated.
   - Pop out, ejection, and leaks caused by air compressibility and expansion.
6) Install a “pressure switch” and “shut-off valve” on the device’s compressed air supply side.
   - The pressure switch is used to disable operation if set pressure cannot be reached. The shut-off valve
7) 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.
8) Rubber parts deteriorate and life is shortened if very dry air is used.
9) Do not use regular joints at places susceptible to static charges. Otherwise system breakdown and/or failure may be caused. Anti-static joints and anti-static tubes are recommended at those places.
10) Note that part of resin materials of the needle valve is not flame retardant.
11) Dust generation inside the paths of the needle valve is not zero. Install a final clean filter in circuits where dust generation causes problems.

3.2 Installation and Adjustment

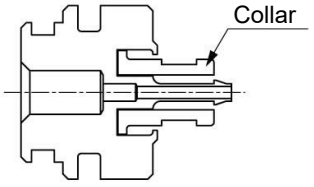
1) Do not apply pressure when rotating the mounting hole.
2) In case of panel mount, the stopper ring interferes with the panel face. Add a plain washer between the mounting hole and panel.



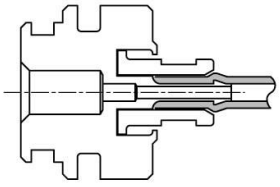
3) The torque of tightening the bolt in the mounting hole may not exceed the value specified in the table below.

Model	Tightening torque
SCL2-N-04	0.5N･m
SCL2-N-06/08/10	0.8N･m

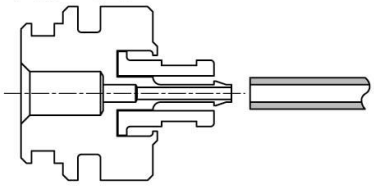
4) An oscillated or twisted product will cause disconnection of the tube. Fix the product, using bolts or a tying band, when performing piping.
5) Connect the air fiber (ϕ1.8 joint) according to the operation method (steps① through⑤) shown below.



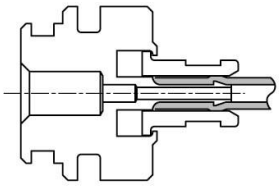
① Insert the collar until it stops.



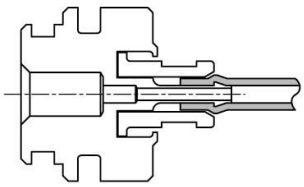
④ Insert Air Fiber until it stops.



② Cut the tip of Air Fiber perpendicularly.



⑤ Pull the collar to lock Air Fibers.



③ Insert Air Fiber properly while checking visually.

3
CAUTION

6) Always flush just before piping pneumatic component.
   - Any foreign matter that has entered during piping must be removed so it does not enter the pneumatic component.

7) When supplying compressed air for the first time after connecting pipes, do not apply high pressure suddenly.
   - Piping connection could be dislocated or the piping tube flies off, leading to accidents.

8) When supplying compressed air for the first time after connecting pipes, confirm that no air is leaking from any pipe connections.
   - Apply a leakage detection agent on pipe connections with a brush, and check for air leaks.

9) Pipe so that piping connection does not deviate by the device's movement, vibration, tension, etc.
   - 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.
   - Confirm that the tube has been inserted properly, and make sure that there is no tension during use. The tube could be dislocated or damaged if there is any tension.

10) Take care of the following when using nylon or urethane tube.
   - Use the designated tube and CKD plastic plug (GWP Series). Do not use metal plugs.

     Tube outer diameter accuracy

     Nylon tube ····· Within ±0.1mm

     Urethane tube (to ϕ6) ····· Within ±0.1mm

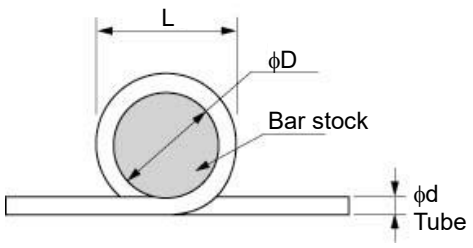
     (ϕ8 to) ····· Within $^{+0.1}_{-0.15}$ mm

     Use a tube with a hardness of 92° or more. If a tube that does not satisfy diameter accuracy or hardness is used, chucking force may drop or the tube may come off or be difficult to insert.
   - When using the standard push-in joint for the spiral tube, fix the base of the tube with a hose band. Holding force drops if the tube rotates.
   - Cut the tube with a dedicated cutter, and cut a right angle.
   - Do not use a worn or damaged tube that could be crush or rupture.
   - Do not reuse a tube that could be deteriorated and deformed.
   - Do not let the tube directly contact other structures. It could wear and break.
   - Make sure that the joint and tube are not twisted or pulled, and that moment load is not applied.

11) Use a tube that is within the minimum bending radius but is long enough to avoid sudden bends.
   - ■ Consider changes in the tube length caused by pressure when the tube is connected, and provide sufficient length within the tube's minimum bending radius.
   - ■ Measurement method

   (1) Minimum tube length (JIS B 8381)

   The radius of a bar stock causing deformation ratio η to be 25% with a tube wound closely around the bar stock is indicated.

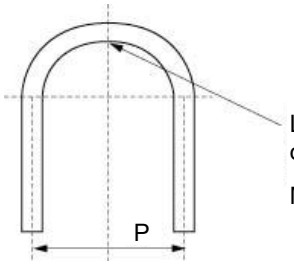


$$\eta = \left(1 - \frac{L - D}{2d}\right) \times 100$$

η : Deformation ratio (%)
d : Outside diameter of tube (mm)
L : Measurement amount (mm)
D : Diameter of bar stock (mm)
(Two times the minimum bending radius)

   (2) Minimum bending radius

   Check the radius at a tube diameter deformation ratio of 10% while simply bending the tube gradually.



Let the minimum mounting pitch P at a deformation ratio of 10% be P.

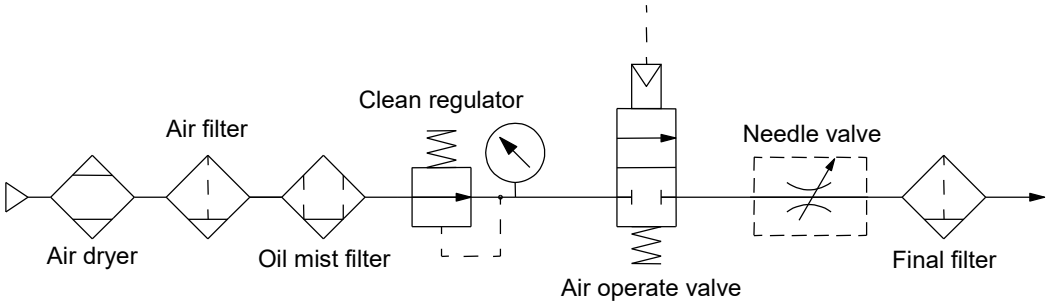
Minimum mounting radius = P/2

12) Secure sufficient space around pneumatics components for installation, removal, and piping work.
13) Install an air filter just before the circuit using the pneumatics components.
14) Avoid using this product for constantly rotating or oscillating applications.
   - ■ Joint could be damaged.
15) Avoid using this product in places with high vibration or impact.
16) Check the needle valve speed or rotation.
   - ■ A stopper mechanism is provided, but damage could result if the needle is turned too far. Check the product's of rotation.
17) Do not turn the knob too forcibly when fully closing or opening the knob (within 0.05N-m). As well, do not pinch the lock nut when adjusting the needle. Otherwise the needle will gall or be broken.
18) Option P80 (oil prohibited specification) is oil prohibited and rotation of the adjusting knob may be hard.

4. OPERATION

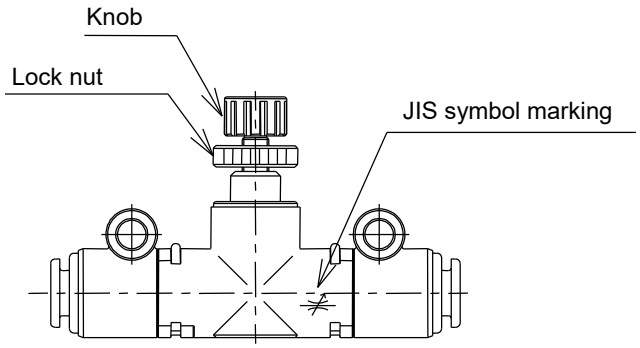
4.1 Fundamental circuit diagram

■ Clean air blower circuit example



4.2 Flow rate adjustment method

- Turn the knob clockwise to reduce the flow rate, or turn it counterclockwise to increase the flow rate.
- After adjusting the flow rate, tighten the lock nut to fix the knob.
- The needle valve has no installation orientation.



5. HOW TO ORDER

SCL2−N − 04 − H44 − 010 − P80

(a) (b) (c) (d)

(a) Body size		(b) O.D. of the applied pipes		(c) Flow rate type		(d) Option	
04	M5 standard	H44	ϕ4	010	Refer to the specifications and flow characteristics graph.	No code	Standard specifications
06	1/8 standard	H66	ϕ6	050		P80	Oil prohibition specifications
08	1/4 standard	H88	ϕ8	150			
				300			

(a) Body size - Combination of (b) O.D. of the applied pipes and (c) Flow rate type

		Body size - O.D. of the applied pipes			
		04-H44	06-H66	08-H66	08-H88
Flow rate type	010	●	●		
	050	●	●		
	150		●		
	300			●	●

indicates an unavailable combination.

* The color of the push ring of the joint is blue with option “P80.”