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SM－323977－A

INSTRUCTION MANUAL

CYLINDER WITH SWITCH (Stroke Adjustable Type)

SCS-LNP (φ125 - φ200)

- 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
The 3rd edition

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For Safety Use

To use this product safety, basic knowledge of pneumatic equipment, including materials, piping, electrical system and mechanism, is required (to the level pursuant to JIS B 8370 Pneumatic System Rules).

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:

⚠ CAUTION :

- Before performing an overhaul inspection on the actuator, deactivate residual pressure completely.
- While the actuator is operating, do not step into or place hands in the driving mechanism.
- To prevent an electric shock, do not touch the electric wiring connections (exposed live parts) of the actuator equipped with a solenoid valve or switch.
  Perform an overhaul inspection with the power off. Also, do not touch these live parts with wet hands.

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Cylinder with Switch (Stroke Adjustable Type)
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1. UNPACKING

1) Make sure that the type No. on the nameplate of the delivered Cylinder with Switch matches the type No. you ordered.
2) Check the appearance for any damage.
3) Stop up the piping port with a sealing plug to prevent the entry of foreign substances into the cylinder. Remove the sealing plug before piping.

2. INSTALLATION

2.1 Installation

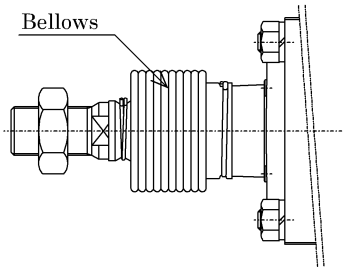
1) The ambient temperature for this cylinder is -5 to 60℃.

2) Use cylinder with bellows over its rod within the area with much dust.

Ambient temperature of bellows Unit : ℃

Material of bellows	Max. ambient temperature	Momentary Max. temp.
Nylon tarpaulin	60	100
Neoplain sheet	100	200
Silicon rubber glass cloth	250	400

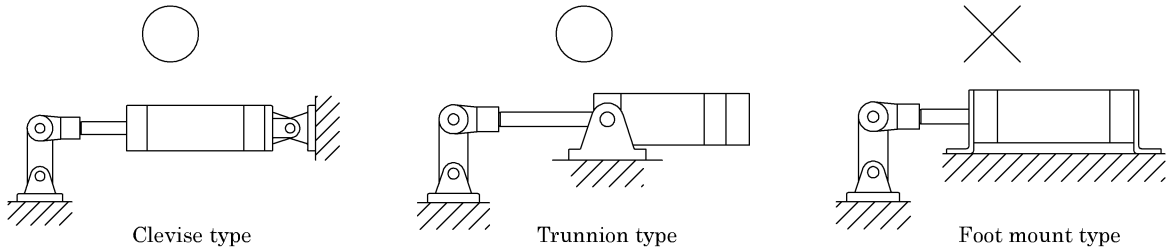
Note : Momentary max. temperature is the temperature as sparks or welding spatter hitting bellows momentarily.



3) Carefully avoid other object from hitting the tube. Otherwise, it may get the tube distorted and cause malfunction of the cylinder.

4) When cylinder is fixed and rod end is guided:
In case the piston rod of cylinder and the load are misaligned, the bushes and packings of the cylinder are extremely worn out. Hence, connect them with CKD floating connector (spherical bearing).

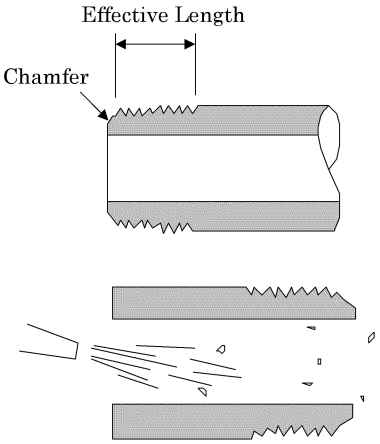
5) When the load acting direction changes with the cylinder operation:
Use an oscillating cylinder (clevis type or trunnion type) capable of making revolution to a certain angle. Furthermore, install the rod and connecting metal (knuckle) so that it moves in the same direction as the cylinder main body does.



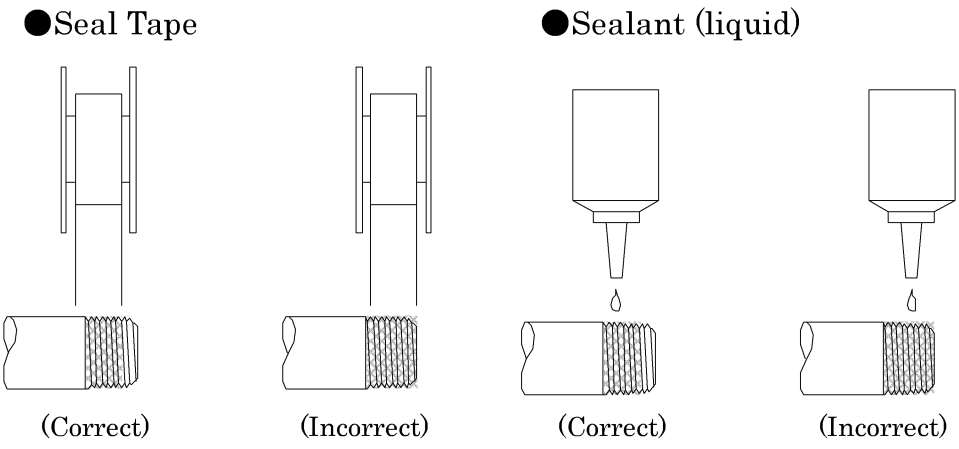
Clevise type Trunnion type Foot mount type

2.2 Piping

1) For piping beyond the filter, use pipes that are tough against corrosion such as galvanized pipes, nylon tubes, rubber tubes, etc.
2) See to it that the pipe connecting cylinder and solenoid valve has effective cross-sectional area which is needed for the cylinder to drive at the specified speed.
3) Install filter preferably adjacent to the upper-stream to the solenoid valve for eliminating rust, foreign substance in the drain of the pipe.
4) Be sure observe the effective thread length of gas pipe and give a chamfer of approx. 1/2 pitch from the threaded end.
5) Flush air into the pipe to blow out foreign substances and chips before piping.

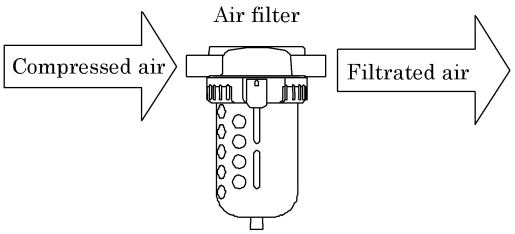


6) Refrain from applying sealant or sealing tape approx. two pitches of thread off the tip of pipe to avoid residual substances from falling into piping system.

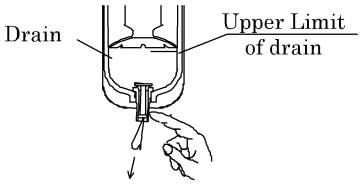


2.3 Fluid

1) It is necessary to use dehumidified air that has been filtered from compressed air. Carefully select an adequate filter that has an adequate filtration rate (preferably 5 μ m or less), flow rate and its mounting location (as nearest to the directional control valve as possible).



2) Be sure to drain out the accumulation in the filter periodically.

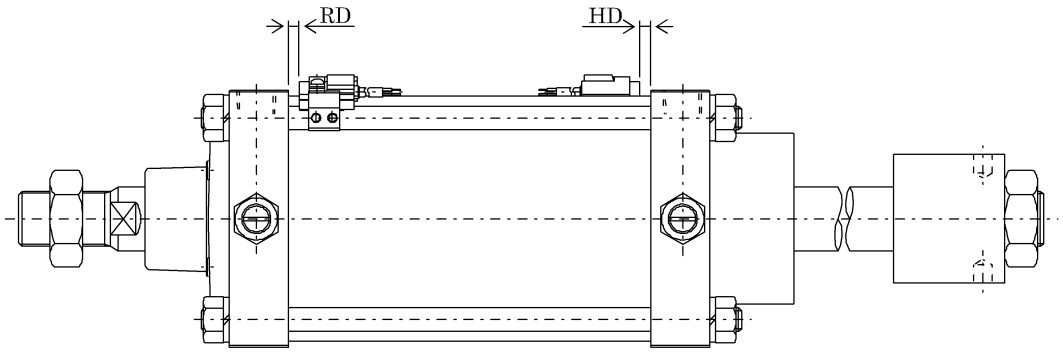


3) Note that the intrusion of carbide for the compressor oil (such as carbon or tarry substance) into the circuit causes malfunction of the solenoid valve and the cylinder. Be sure to carry out thorough inspec-tion and maintenance of the com-pressor.

4) This cylinder does not require lubrication. It is recommended, however, to use Turbine oil Grade 1, ISO VG32 as a lubricant, if and when lubrication is needed.

2.4 Location of mounting Switches on a Cylinder

1) Location of mounting switches on a cylinder.

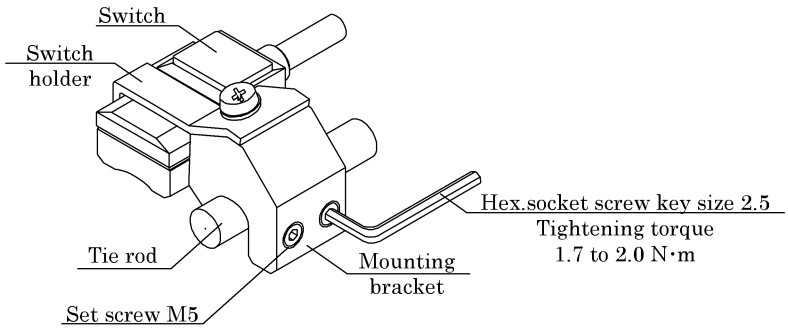


(1) At the stroke end
Refer the illustration above. Mount switches within the rod side dimension RD as well as the head side dimension HD for the purpose of having switches function at the points of the maximum sensitive position. Since the dimensions HD and RD of ϕ125 to 180 cylinders are 0, mount the switch contact plate on the rod cover or head cover.

(2) Intermediate of stroke
Move the piston where it is anticipated to stop and fix it tentatively Slide a switch carefully along the side of cylinder over the piston to find out the spot where switch turns on. This type spot should be located on both side of piston. The intermediate spot between those posits is of the maximum sensitive position and where the switch is supposed to be installed.

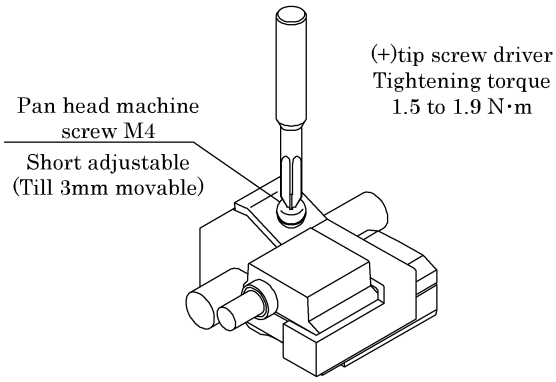
(3) Location around the circumference of cylinder
There is no restriction. However,90° interval around circumference will be the most appropriate location when considered convenient posture of mounting tie rods.

(4) Relocation of switch
Loosen the set screws (2 ea.) for approx. 1/2 to 3/4 turn. It enables the switch to slide along the tie rod without letting screws drop off.
After setting the new location of switch, hold switch holder against the tube surface and tighten set screws to the tie rod. Adequate torque of tightening it is 1.7 to 2.0 N・m. It is considered to be sufficient, as a rule of thumb, when Allen wrench starts bending slightly.

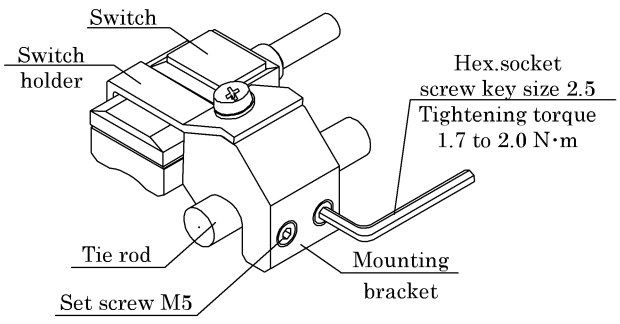


2) Installation of switch
Follow the procedures (1) to (3) as described below.

(1) While holding a switch underneath of switch holder, tighten M4×10 pan headed machine screws to mount it on the bracket.



(2) Screw-in the set screws to mount the bracket on the tie rod. While letting the mounting bracket hook the tie rod, slightly screw further until it touches the rod. Thus, it eliminates the whole set of switch from falling off the rod, yet enables to slide the set along the rod. Make use this merit when engaged in adjusting location of the switch set.

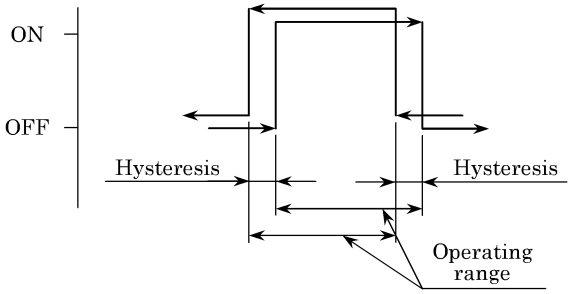


(3) To fix the mounting bracket on the tie rod, tighten screws while pressing bracket slightly against tube. Adequate torque of tightening screw is 1.7 to 2.0 N·m. It is considered to be sufficient, as a rule of thumb, when Allen wrench starts bending slightly.

3) Operating range
The switch turns on first and turns off as the piston moves along its stroke. Precise operating range deviate slightly depending upon the direction of piston movement as shown right.

4) Hysteresis
Precise operating range deviate slightly depending upon the direction of piston movement as shown right.

5) Table of the dimension of maximum sensitive position (HD・RD), operating range and hysteresis.



(Unit : mm)

Item	Maximum sensitive position		Solid state switch type (R1K, R2K, R2YK, R3K, R3YK)				Reed switch (R0,R4,R5,R6)	
Bore size (mm)	HD	RD	Operating range		Hysteresis		Operating range	Hysteresis
			One color type	Two color type	One color type	Two color type		
φ125	0	0	7.5 to 14	14 to 21	1.5 or less	1.0 or less	11 to16	3 or less
φ140	0	0	7.5 to 14	18 to 26				
φ160	0	0	7.5 to 14	18 to 26				
φ180	0	0	7.5 to 14	18 to 26				
φ200	1	2	7.5 to 14	18 to 26				

(Unit : mm)

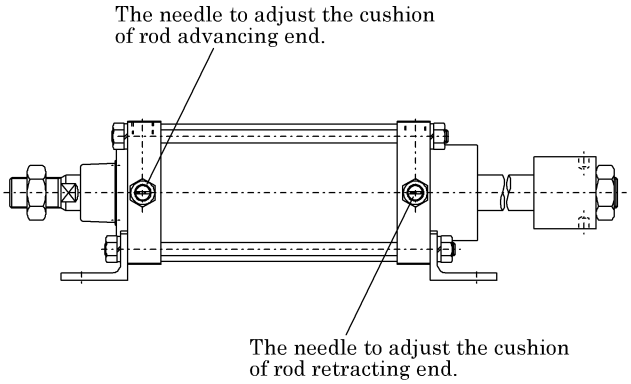
Item	strong magnetic field proof solid state switch (T2YDP)							
Bore size (mm)	Maximum sensitive position				Operating range		Hysteresis	
	HD		RD					
	One color type	Two color type	One color type	Two color type	One color type	Two color type	One color type	Two color type
φ125	—	3.5	—	3.5	—	6.5 to 8	—	1.0 or less
φ140	—	3	—	3	—	6.5 to 8.5	—	
φ160	—	4	—	4	—	6.5 to 8.5	—	
φ180	—	5	—	5	—	6.5 to 9	—	
φ200	—	5	—	7	—	7 to 9	—	

3. OPERATION

3.1 Operating the Cylinder

1) The working pressure for this type of cylinder is specified in "Cylinder Specification". Operate the system within this range.

2) Though the cushion has been adjusted at no load when delivered, adjust the cushion needle when the change of cushion effect is required.
Tightening the needle (clockwise) makes cushion more effective. Tighten the needle lock nut all the way after adjustment.



However, if kinetic energy such as load is heavy or speed is too fast, exceeding the values given in Table 1, consider of providing a shock absorber.

Table 1. Table of cushion characteristics

Bore size (mm)	Effective air cushion length(mm)	Allowable energy absorption (J)	
		With cushion	Without cushion
ϕ 125	21.6	63.5	0.1
ϕ 140		91.5	
ϕ 160		116	1.5
ϕ 180		152	2.1
ϕ 200	26.6	233	2.8

3) Adjust the working piston speed with the speed controller mounted.

3.2 How to adjustable stroke

1) Caution

(1) Release air before adjusting stroke.

(2) When carrying out stroke adjustment more than effective air cushion length, a cushion completely loses its effect.

2) How to adjustable stroke

(1) Please fit a steel bar or a bolt over the hole made in a stopper's side, and loosen a lock nut with a adjustable spanner or a spanner. (Refer to Table 2 for a size.)

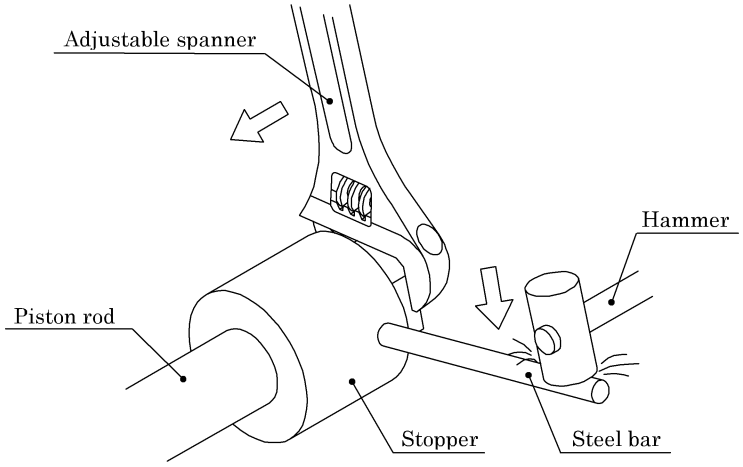
Table2. Width across flats

Bore size (mm)	Hole diameter of stopper (mm)	Width across flats of lock nut (mm)
ϕ125	ϕ10	46
ϕ140	ϕ10	46
ϕ160	ϕ14	55
ϕ180	ϕ14	60
ϕ200	ϕ14	70

(2) If it adjusts to a predetermined stroke and a stopper's position is determined, please fit a bar or a bolt over a stopper's hole, and tighten a lock nut with a adjustable spanner. (Please fix the lock nut with a adjustable spanner, with a hammer, strike shockingly a bar or the bolt fitted over a stopper's hole, and tighten it. The torque with a bundle is as in Table 3.)

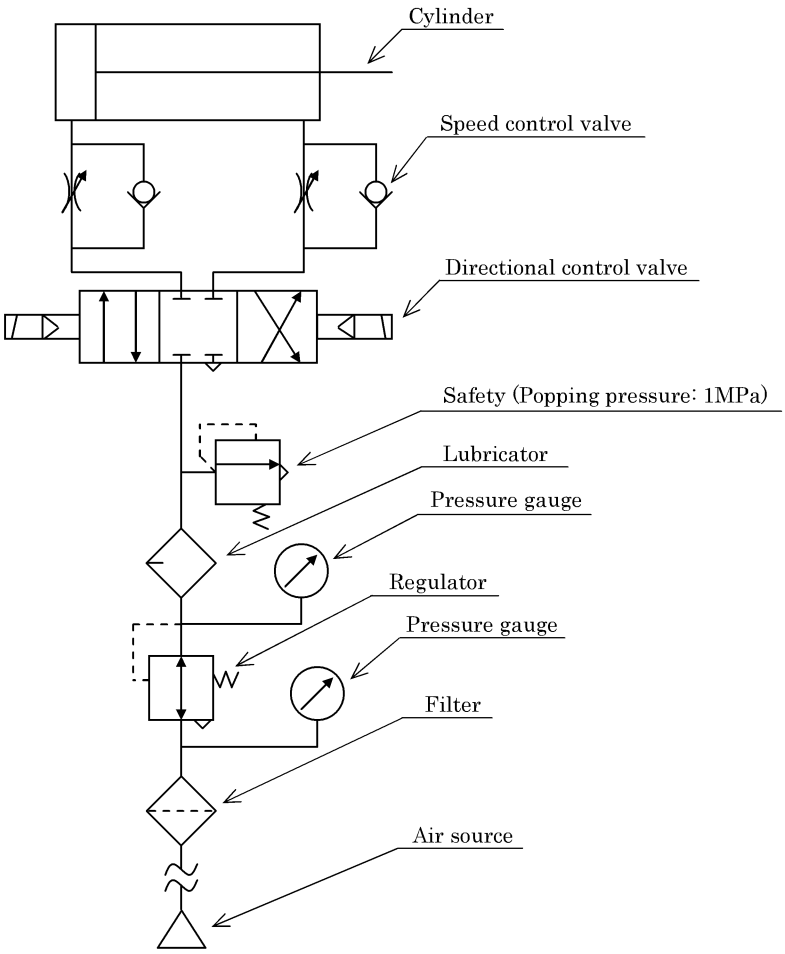
Table3. Adjustable stroke recommended tighten torque.

Bore size (mm)	Recommended tighten torque (N･m)
ϕ125	363
ϕ140	363
ϕ160	647
ϕ180	843
ϕ200	1290



3.3 About the system applicable to class 2 pressure vessel

If the system is applicable to class 2 pressure vessel, install a safety valve while referring to the fundamental pneumatic circuit diagram shown below. (The following diagram shows an example of the safety valve mounting orientation.)



<Fundamental pneumatic circuit diagram>

3.4 How to use the Switches

3.4.1 Common items

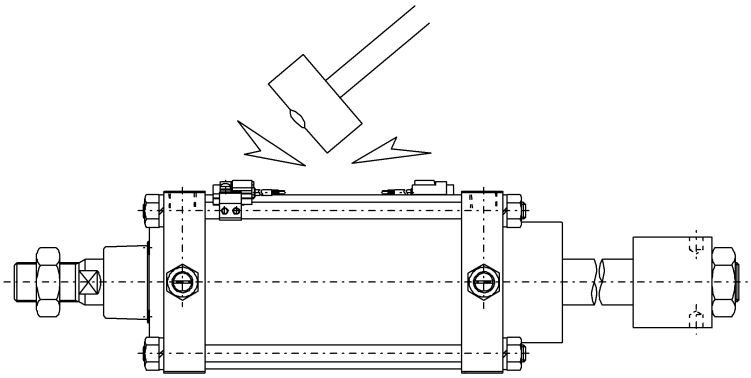
1) Magnetic environment
Do not operate this product in a place where a strong magnetic field or large current (large magnet or spot welder, etc.) exists. If a cylinder with the switch is installed in parallel to this product or the magnetic substance moves near the cylinder, the mutual interference may occur and affect the detection accuracy.

2) Lead wire wiring
Carefully perform the wiring so that a bending stress or tensile strength does not apply to the lead wire repeatedly.
Additionally, connect wires for robot having the bending resistance to movable parts.

3) Operating temperature
Do not operate the product at a high temperature (60°C).
Always avoid operation of the product in a hot place due to temperature characteristics of magnetic and electronics parts.

4) Intermediate position detection
When activating the switch halfway of the stroke, the relay may not respond if the working piston speed is too fast.
When the operation time of the relay is 20 ms, operate the product at a working piston speed of 500 mm/s or less.

5) Impact
Do not apply a large vibration or impact to the product when transporting the cylinder, or mounting or adjusting the switch.



3.4.2 Reed switch (R0, R4, R5, R6)

1) Lead wire connections

Do not connect the lead wires of the switch to the power supply directly. Always connect the loads in series. For R0 switch, carefully check following items (1), (2).

(1) When using the switch for DC power supply, connect the brown and blue lines to the positive and negative sides, respectively. If these lines are connected reversely, the switch is activated, but the indicator light is not lit.

(2) When the switch is connected to an AC relay or a programmable controller input, the indicator light on the switch is not lit if the half-wave rectification is performed in the connected circuit. If this occurs, reverse the polarities of the switch lead wire connection. The indicator light may then be lit.
Note that the R4 and R5 switches have no polarities.

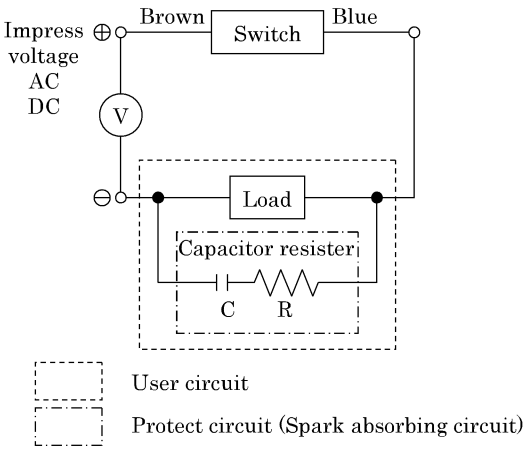
2) Contact protective measures

When an inductive load, such as relay is used or the wire length exceeds that stated in Table 1, always install a contact protective circuit.

Table 1

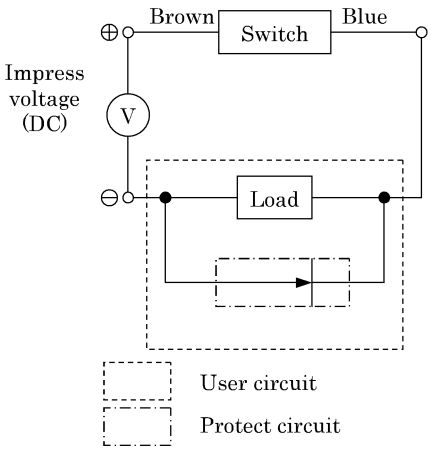
Switch	Electric power	Length of wire
R0, 5, 6	DC	100m
R0, 5	AC	10m
R4	AC	50m

(1) Protective circuit when connecting an inductive type load.



Recommended value
C (Capacitor) 0.033 to 0.1 μF
R (Resister)1 to 3kΩ
XEB1K1 Okaya Denki Mfg or equivalent

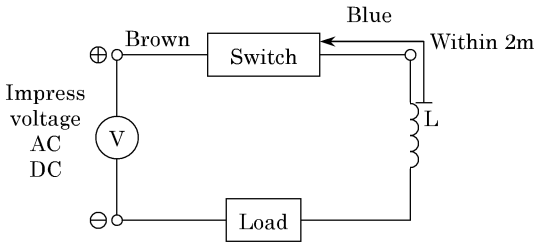
Fig.1 When capacitor resister is used.



Rectifying diode, general use
Hitachi Mfg. product V06C or equivalent

Fig.2 When diode is used.

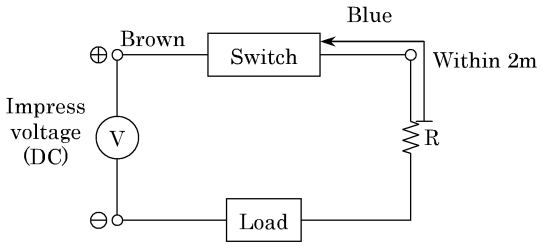
(2) Protective circuit when the wire length exceeds that stated Table 1



・ Choke coil
L=a couple hundred μH to a couple mH
surpassing high frequency characteristic

・ Install it near by a switch (within 2m).

Fig.3



・ Dash current restriction resister
R=As much large resister as the load circuit can afford.

・ Install it near by a switch (within 2m).

Fig.4

(3) Contact capacity

Do not use a load exceeding the maximum contact capacity of the switch. Additionally, if the current is lower than the rated current value, the indicator light may not be lit. (R0, R6)

(4) Relay

Always use the relays listed below.
Omron Corporation ·····MY type
Fuji Electric Co.,Ltd. ·····HH5 type
Panasonic, Ltd. ·····HC type

(5) Series connection

When multiple R0 switches are used with they connected in series, the voltage drop at the switch becomes the sum of voltage drop values of all switches.
Therefore, the voltage applied to the load becomes a voltage that the voltage drop at the switch is subtracted from the power supply voltage. Thus, always check the minimum operating voltage value of the load.

Example: The following shows the voltage drop at the switch when three R0 switches are connected in series.

2.4V × 3 = 7.2 V

Since the voltage drop at the R5 switch is 0V, as many switches as required can be connected in series. When one R0 switch is used for checking of operation and R5 switch is used for other switches, they can be used with the voltage drop equivalent to one R0 switch (2.4V). In this case, the indicator light is lit only when all switches are turned ON.
If two R4 switches are connected at 100V AC or three or more R4 switches are connected at 200V AC, the indicator light is not lit. Additionally, the R6 switch cannot be connected in series.

(6) Parallel connection

When multiple R0 and R5 switches are connected in parallel, there are no limitations on the number of switches. When multiple R4 and R6 switches are connected in parallel, the leakage current increases for the number of switches. Therefore, carefully check the load specifications to determine the number of switches to be connected.

However, if multiple R0 and R6 switches are turned ON at the same time, the indicator light becomes dark or is not lit. For R4 switch, if even one R4 switch is turned ON, all indicator lights go off.

2) Connection load

The R1 switch can be connected to a load, such as AC programmable controller, relay, solenoid, or solenoid valve.

The R2 switch is specially designed as a programmable controller switch. Since this switch uses two wires, it is connected to either the sink input or source input.

The R3 switch can be connected to a load, such as digital IC, microcomputer, programmable controller, relay, solenoid, or solenoid valve.

When selecting or designing a load, carefully check the static electrical characteristics, as well as transient electrical characteristics (rush current when the switch is turned ON or surge voltage when the switch is turned OFF) so that they do not exceed the switch ratings. Additionally, if the electrical characteristics may exceed the switch ratings, appropriate protective measures are taken (surge absorbing element or rush current limiting resistance, etc.).

3) Strong magnetic field proof switch (T2YDP)

● External magnetic field proof performance (at welding current of AC14000A)

This strong magnetic field proof switch can be used for all T-type strong magnetic field non-contact switch (T2YD) built-in cylinder models or operated in a status that the welding cable is in contact with the cylinder or switch. However, this switch cannot be used for two or more welding cables or within the cable loop.

Note : If this switch is used at a welding current of more than AC14000A, the welding cable must be made 35 mm or more apart from the cylinder tube surface.
(Testing conditions: Outside diameter of the cable is ϕ 36.)

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4. MAINTENANCE

4.1 Periodical Inspection

1) In order to upkeep the cylinder in optimum condition, carry out periodic inspection once or twice a year.

2) Inspection items
   (1) Check the bolts and nuts fitting the piston rod end brackets and mounting brackets for slackening.
   (2) Check to see that the cylinder operates smoothly.
   (3) Check any change of the working piston speed and cycle time.
   (4) Check for internal and/or external leakage.
   (5) Check the piston rod for flaw (scratch) and deformation.
   (6) Check the stroke for abnormality.
   See "Trouble shooting", 5 should there be any trouble found, also carry out additional tightening if bolts, nuts, etc. are slackened.

3) Inspect the following items.
   (a) Scratch marks on the boar surface of the tube
   (b) Scratch marks on the surface of piston rod, peel-off of plating and rusting
   (c) Scratch marks and wear inside of the bush
   (d) Scratch marks, wear and crack of the surface of piston
   (e) Loosened connection of piston and rod
   (f) Crack of both end covers
   (g) Scratch marks and wear of packing in sliding part. (Dust wiper, rod packing, cushion packing and piston packing)
   Check all of above items. If any abnormality is found, repair it or replace the parts, when defective.

4) Followings are expendable parts.

No.	Name \ Bore size (mm) / Kit No.	φ125	φ140	φ160	φ180	φ200
		SCS-LND-125K	SCS-LND-140K	SCS-LND-160K	SCS-LND-180K	SCS-LND-200K
3	Dust wiper	SFR-35K	SFR-35K	SFR-40K	SFR-45K	SFR-50K
4	Rod packing	PNY-35	PNY-35	PNY-40	PNY-45	PNY-50
8	Metal gasket	RG-53	RG-53	RG-63	RG-63	RG-70
9	Cylinder gasket	P12115-12150200	P12115-13450200	H4-543105	H4-543106	P12115-19450200
12	Piston packing	PSD-125	PSD-140	PSD-160	PSD-180	PSD-200
13	Wear ring	F4-666997	F4-666998	F4-666999	F4-667000	F4-667001
24	Cushion packing	PCS-45	PCS-45	PCS-55	PCS-55	PCS-60
29	Needle gasket	P-9	P-9	P-9	P-9	P-9

Note : Packings are stocked as a kit. This kit basically contains parts necessary for replacement. It is recommended not only to replace the defective parts, but also to replace the complete parts with ones included in the kit. Specify the kit No. when ordering.

4.2 Disassembling

Should any air leakage occur, take the following corrective actions.

1) Prepare the following tools for disassemling.

Disassembling tools

Name	Qty	Place of use	Applicable tube ID (mm)
Hex. bar spanner (Nominal 5)	1	Hexagon socket head cap screw	ϕ 125, ϕ 140
Hex. bar spanner (Nominal 6)	1	Hexagon socket head cap screw	ϕ 160, ϕ 180
Hex. bar spanner (Nominal 8)	1	Hexagon socket head cap screw	ϕ 200
Wrench (Nominal 22)	2	Hex. nut (Tie rod)	ϕ 125, ϕ 140
Wrench (Nominal 24)	2	Hex. nut (Tie rod)	ϕ 160
	1	Needle nut	For all tube ID
Wrench (Nominal 27)	2	Hex. nut (Tie rod)	ϕ 180
Wrench (Nominal 30)	2	Hex. nut (Tie rod)	ϕ 200
Standard driver	2	Cushion needle, Piston packing Cushion packing disassembling	For all tube ID
Marret hammer	1	For disassembling Cover and Tube	For all tube ID
Ice pick	1	Packing other than piston packing	For all tube ID
Press jig	1	Cushion packing assembly	For all tube ID

2) Disassembly

(1) Shut off the fluid and remove the residual pressure.

(2) Disconnect pipes from cylinder.

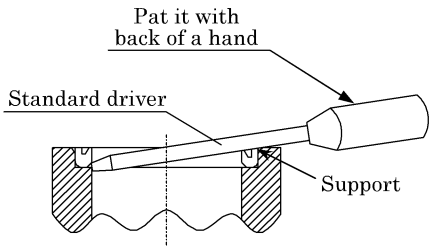
(3) Take out rod metal ⑥ by removing hexagon socket head cap screw ㉟.

(4) As the hexagon nut ⑮ is removed, each mounting bracket and tie rod ⑯ can be removed. As the tie rod ⑯ is removed, the rod cover ⑦, head cover ㉕, and piston assembly (②, ⑪ to ⑬, ⑱, ㉑ to ㉓) can then be removed.

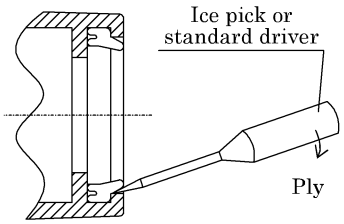
(5) Cushion needle ㉗ comes out when needle nut ㉘is removed.

(6) Disassembling cushion packing ㉔.

- Clamp the cover in a vise.
- Place the standard driver underneath of lip of packing, then ply the shuttle driver making the corner of the spot facing a fulcrum. Patting the driver handle with the back of hand will let the packing come out of its spot facing on the cover.

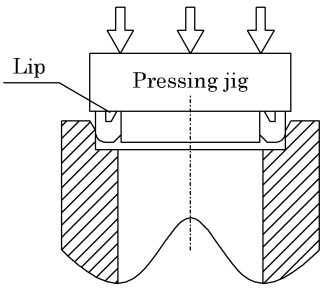


(7) Disassembling dust wiper ③ and disassembling rod packing ④.
Pry the packing off with a tool having the sharp tip, such as standard screwdriver or ice pick.
(Do not reuse the detached packing.)



4.3 Assembly

1) Clean and wash every part.
Carefully assemble them in the reversed procedure of disassembling, particularly, to prevent any damage to lips of packings and seals as it causes malfunction and/or air leakage when it is placed back to service.

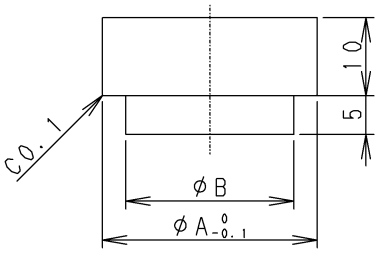


2) Assembling the cushion packing.
Use special jig to press the packing into the spot facing on the cover to avoid its tilting and also its damage. Press it down to the point that lip tip of packing settle approx. 0.1 to 0.2mm below the surface of the cover.

Table 2 and drawing are for a couple of examples of press jigs.

Table 2. Dimensions of press jigs

Bore size (mm)	A	B
φ125, φ140	55	45
φ160, φ180	67	55
φ200	72	60



3) Apply a film of high grade grease (such as No. 1 or No. 2, Lithium base saponaceous grease) over the bore surface of Cylinder tube ⑩, circumference surface of Piston ㉒ and packings ③, ④, ⑧, ⑨, ⑫, ㉑, ㉔, ㉙.

4) When tightening the nuts on tie rods, gradually tighten each nut on diagonal location to each other respectively, instead of tightening one nut all the way up. The table right displays the recommended range of torque for tightening.

Table 3. Tightening torque

Bore size (mm)	Torque (N·m)
φ125, φ140	22
φ160	34
φ180	49
φ200	69

4.4 Inspection

1) Function Test

After a couple of trial running, the piston should reciprocate smoothly when pressure is charged alternately to each end of cylinder respectively.

- Inspection terms
- Pressure supplied 0.1 MPa and working pressure
- Cushion needle Fully open

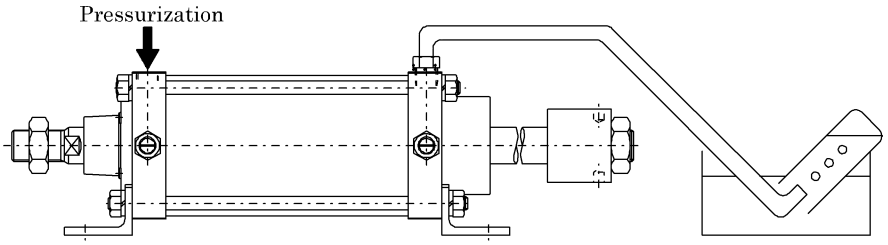
2) Leakage test

When compressed air is charged from head end and rod end alternately while holding piston in one position, the leakage should be held less than the followings :

Internal leakage $3+0.15\times D$ cm^3/min (Standard condition)
External leakage $3+0.15\times d$ cm^3/min (Standard condition)
} or less.

Whereas D = Cylinder bore size (mm)
d = OD of piston rod (mm)

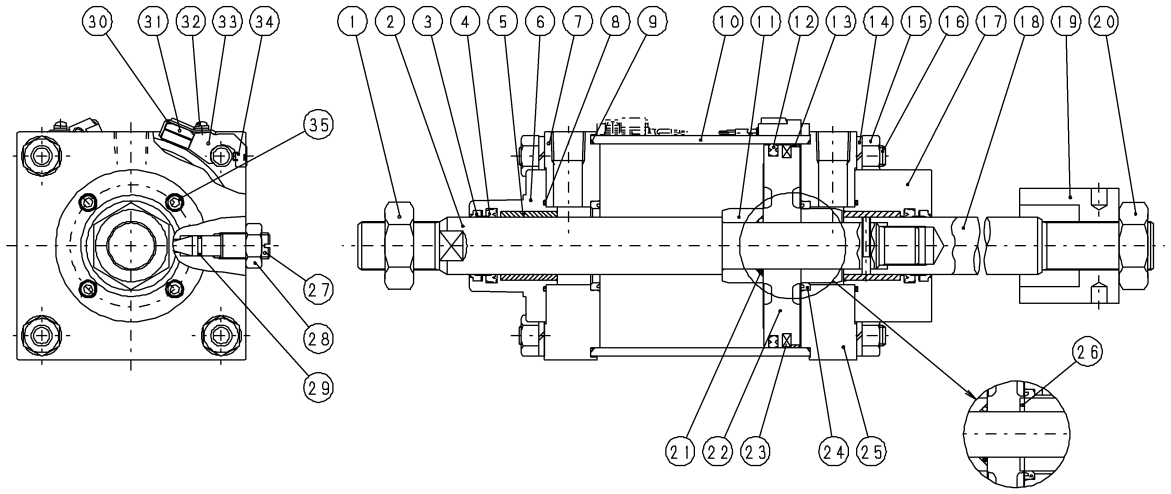
・Procedures of inspection
・Substitution with water



・Soapy water bubble balloon method
It only displays whether there is air leakage or not, while it is unable to decide the volume of leakage.

4.5 Internal structure and Expendable parts list

1) φ125 to φ200



When the tube bore is 160 to 200.

No.	Parts Name	Material	Qty	Remarks
1	Rod nut	Steel	1	Zinc chromate
2	Piston rod	Steel	1	Industrial chrome plating
3	Dust wiper	Nitril rubber	2	
4	Rod packing	Nitril rubber	2	
5	Bush	Oil impregnated bearing alloy	2	
6	Rod metal	Cast iron	1	
7	Rod cover	Steel	1	
8	Metal gasket	Nitril rubber	2	
9	Cylinder gasket	Nitril rubber	2	
10	Cylinder tube	Aluminium alloy	1	
11	Cushion ring A	Steel	1	Hard alumite
12	Piston packing	Nitril rubber	1	
13	Wear ring	Acetar resin	1	
14	Spring washer	Steel	8	Painting
15	Hexagon nut	Steel	8	Painting
16	Tie rod	Steel	4	Painting
17	Rod Metal	Steel	1	Phosphoric acid mangan treatment
18	Piston rod B	Steel	1	Industrial chrome plating
19	Adjustable stopper	Steel	1	Phosphoric acid mangan treatment
20	Rock nut	Steel	1	
21	Piston gasket	Nitril rubber	1	
22	Piston	Aluminum alloy die-casting	1	
23	Magnet	Rubber magnet	1	
24	Cushion packing	Nitril rubber・Steel	2	
25	Head cover	Steel	1	
26	Collar for piston	Steel	1	Zinc chromate
27	Cushion needle	Steel	2	Zinc chromate
28	Needle nut	Steel	2	Zinc chromate
29	Needle gasket	Nitril rubber	2	
30	Switch holder	Stainless steel	2	
31	Cylinder switch		2	
32	Cross recessed round head screw with spring washer and small round washer	Steel	2	Zinc chromate
33	Switch bracket	Aluminum alloy	2	
34	Hexagon socket set screw	Steel	4	Blackening
35	Hexagon socket head cap screw	Steel	4	Blackening

Note : Parts 24, 27, 28, 29 are not required when it is without cushion.

Discontinue

Expendable parts list (Specify the kit No. on your purchase order.

Part No. / Part Name / Bore size (mm) / Kit No.		③	④	⑧	⑨
		Dust wiper	Rod packing	Metal gasket	Cylinder gasket
ϕ125	SCS-LND-125K	SFR-35K	PNY-35	RG-53	P12115-12150200
ϕ140	SCS-LND-140K	SFR-35K	PNY-35	RG-53	P12115-13450200
ϕ160	SCS-LND-160K	SFR-40K	PNY-35	RG-63	H4-543105
ϕ180	SCS-LND-180K	SFR-45K	PNY-45	RG-63	H4-543106
ϕ200	SCS-LND-200K	SFR-50K	PNY-50	RG-70	P12115-19450200

Part No. / Part Name / Bore size (mm) / Kit No.		⑫	⑬	㉔	㉙
		Piston packing	Wear ring	Cushion packing	Needle gasket
ϕ125	SCS-LND-125K	PSD-125	F4-666997	PCS-45	P-9
ϕ140	SCS-LND-140K	PSD-140	F4-666998	PCS-45	P-9
ϕ160	SCS-LND-160K	PSD-160	F4-666999	PCS-55	P-9
ϕ180	SCS-LND-180K	PSD-180	F4-667000	PCS-55	P-9
ϕ200	SCS-LND-200K	PSD-200	F4-667001	PCS-60	P-9

5. TROUBLE SHOOTING

1) Cylinder

Trouble	Causes	Countermeasure
Does not operate.	No pressure or inadequate pressure.	Provide an adequate pressure source.
	Signal is not transmitted to direction control valve.	Correct the control circuit.
	Improper or misalignment of installation.	Correct the installation state. Connect the floating connector. Change the mounting style.
	Broken piston packing	Replace the cylinder.
Does not function smoothly.	Speed is below the low speed limit	Limit the load variation
	Improper or misalignment of installation.	Correct the installation state. Connect the floating connector. Change the mounting style.
	Exertion of transverse (lateral) load.	Install a guide. Revise the installation state and/or change the mounting style.
	Excessive load.	Increase the pressure itself and/or the inner diameter of the tube.
	Speed control valve is built in the way of "Meter in" circuit.	Change the meter-out circuit of the speed control valve.
Breakage and/or deformation	Impact force due to high speed operation	Turn the speed down. Reduce the load and/or install a mechanism with more secured cushion effect (e.g.external cushion mechanism).
	Exertion of transverse load.	Install a guide. Reverse the installation state and/or change the mounting style.

2) Switch

Troubles	Causes	Remedies
Indicator light is not lit.	Deposited contact point	Replace the switch.
	Excessive load than rated capacity	Replace the relay with a recommended one or replace the switch.
	Damaged indicator light	Replace the switch.
	Inadequate incoming signal	Review the external signal circuit and remove the causes.
Switch does not function right.	Broken circuit	Replace the switch.
	Inadequate incoming signal	Review the external signal circuit and remove the causes.
	Improper voltage	Correct voltage to specified.
	Incorrect location of switch	Correct its location.
	Aberrant position of switch	Set it back to original position and tighten the mounting device. Tightening torque is 1.5 to 1.9 N·m
	Incorrect direction of switch mounting	Correct the direction of the switch mounting.
	Relay is unable to respond properly	Replace the relay with a recommended one.
	Excessive load than rated capacity	Replace the relay with a recommended one or replace the switch.
	Excessive speed of piston if it is to sense an intermediate point of stroke	Reduce the speed of piston.
Switch does not return.	Piston is not moving	Make the piston move.
	Deposited contact point	Replace the switch
	Excessive load (relay) than rated capacity	Replace the relay with a recommended one or replace the switch.
	Improper ambient temperature	Adjust the ambient temperature within the range of -10 to 60℃
	Existence of a foreign magnetic field	Shield the magnetic field.
	Inadequate incoming signal	Review the external signal circuit and remove the causes.

Note 1. Refer "2. INSTALLATION" as for replacing a switch and correcting its location.

Discontinue

6. HOW TO ORDER

6.1 Product Number Coding

SCS-LNP – LB – 125 B – 50 – R0 – R – Y

(a) (b) (c) (d) (e) (f) (g) (h)

(a) Model		(b) Mounting style		(c) Bore size (mm)	
SCS-LNP	Stroke adjustable type Pre-lubricated with switch	00	Basic type	125	ϕ 125
		LB	Axial foot type	140	ϕ 140
		FA	Rod side flange type	160	ϕ 160
		FB	Head side flange type	180	ϕ 180
		TC	Center trunnion type	200	ϕ 200
		TA	Rod side trunnion type	※ ϕ 250 with switch is not manufacturable.	
		TB	Head side trunnion type		

(d) Cushion		(e) Stroke length (mm)			(f) Adjustable stroke range (mm)	
B	Both side cushion	Standard stroke	Maximum stroke length		25	25
R	Rod side cushion	50	Bore size	Stroke	50	50
H	Head side cushion	75	125	800	75	75
N	Non cushion	100	140	800	100	100
		150	160	800		
		200	180	900		
		250	200	1000		
		300				

(g) Switch model				(h) Qty. of switch		(i) Option & Accessory	
Grommet	Terminal box	Switch type	Lead wire	R	Rod side, 1ea	I	Single knuckle
				H	Head side, 1ea	Y	Double knuckle
R1K※	R1KB	Solid state switch	2-wire	D	2ea	B1	Single bracket
R2K※	R2KB			T	3ea	B2	Double bracket
R2YK※	R2YKB			4	4ea	C2	Cushion with a check valve
R3K※	R3KB		3-wire			J	Bellow: Nylon tarpaulin
R3YK※	R3YKB					K	Bellow: Neoprene sheet
T2YDP※	—		2-wire			L	Bellow: Silicone rubber glass cloth
R0※	R0B	Reed switch	2-wire			M	Alteration in piston rod material
R4※	R4B					No code	Cushion needle position R (Standard)
R5※	R5B					S	Cushion needle position S
R6※	R6B					T	Cushion needle position T

Note : A spray-proof terminal box type (R□A) is also available.

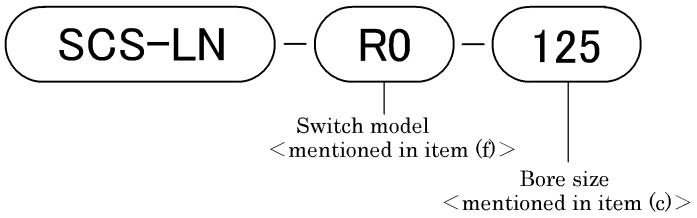
※ mark indicates the length of lead wire.

※ Lead wire length	
No code	1m (Standard)
3	3m (Option)
5	5m (Option)

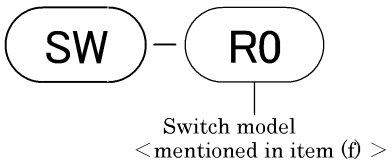
Discontinue

6.2 Switch component parts Model coding

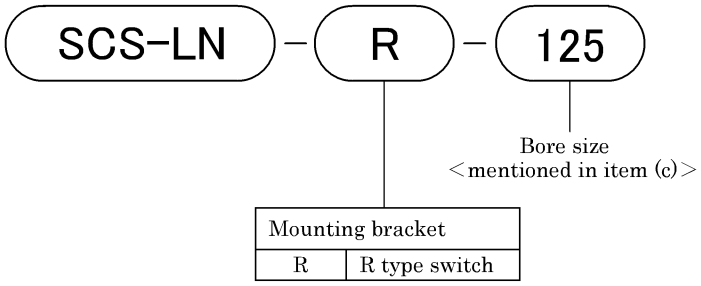
- Switch body + Mounting bracket



- Switch alone



- A set of mounting bracket



7. SPECIFICATION

7.1 Cylinder Specification

Model / Item		SCS-LNP				
Bore size		ϕ125	ϕ140	ϕ160	ϕ180	ϕ200
Actuation		Double acting ・Stroke adjustable type				
Working fluid		Compressed air				
Max. working pressure	MPa	1.0				
Min. working pressure	MPa	0.1				
Proof pressure	MPa	1.6				
Ambient temperature	℃	−5～60 (No freezing)				
Port size		Rc1/2	Rc3/4			
Stroke tolerance	mm	$^{+1.0}_{0}$ (to 300)、$^{+1.4}_{0}$ (to 500)、$^{+2.0}_{0}$ (to 1000)				
Working piston speed	mm/s	20 to 1000 (use this within absorbed energy range.)				
Cushion		Air cushion (when adjustable stroke, rod side cushion is not provided.)				
Effective air cushion length	mm	21.6				26.6
Adjustable stroke length	mm	25、50、75、100				
Lubrication		Required (when lubrication, use turbine oil Class 1 ISO VG32)				
Copper and PTFE free specification		Option				
Allowable energy absorption	J	63.5	91.5	116	152	233

7.2 Switch Specification

1) Types and applications of switches

Type & Model		Applications	Load voltage / current
Solid state switch	R1K	For use with programmable controller, relay, compact solenoid valve	AC85 to 265V 5 to 100mA
	R2K	For use exclusively with programmable controller	DC10 to 30V 5 to 30mA
	R2YK (bi colors indication)		
	R3K	For use with programmable controller, relay, IC circuit, compact solenoid valve	DC30V or less DC200mA or less
	R3YK (bi colors indication)		DC30V or less DC150mA or less
	T2YDP	For use exclusively with programmable controller	DC24V 5 to 20mA
Reed switch	R0	For use with, relay, programmable controllers	DC12/24V, 5 to 50mA AC100V, 7 to 20mA AC200V, 7 to 10mA
	R4	For use with high capacity relay, solenoid valve	AC100V, 20 to 200mA AC200V, 10 to 200mA
	R5	For use with programmable controller, relay, IC circuit, (without indicator light), series connection	DC12/24V, 50mA or less AC100V, 20mA or less AC200V, 10mA or less
	R6	For use exclusively with programmable controller (with DC self-holding function)	DC24V, 5 to 50mA

Discontinue

2) Switches specification

Type & Model / Item	Solid state switch		
	R1K	R2K	R2YK (2-color display)
Applications	For use with programmable controller, relay, compact solenoid valve	For use exclusively with programmable controller	
Power supply voltage	—		
Load voltage	AC85 to 265V	DC10 to 30V	
Load current	5 to 100mA	5 to 30mA (Note 2)	
Current consumption	—		
Internal voltage drop	7V or lower	4V or lower	
Indicator light	Lit when LED is on		LED (Red/Green) (Lit when power is ON)
Leakage current	1mA or lower at ac100V 2mA or lower at ac200V	1mA or lower	1.2mA or lower
Lead wire length	1 m (Oil-proof vinyl cabtyre cord, 2-wire, 0.3mm²)		
Shock resistance	980m/s²		
Insulation resistance	20 MΩ or more measuring with DC500V megger tester		
Withstand voltage	AC1,500V for 1 minute	AC1,000V for 1 minute	
Ambient temperature	-10 to 60℃		
Degree of protection	For Grommet - IEC Standard IP67, JIS C 0920 (water tight type), Oil resistance		
Option	R※A (IP67) with terminal box, R※B (no water-proof) with terminal box		

Type & Model / Item	Solid state switch		
	R3K	R3YK (2-color display)	T2YDP
Applications	For use with programmable controller, relay, IC circuit, compact solenoid valve		For use exclusively with programmable controller
Power supply voltage	DC4.5 to 28V		—
Load voltage	DC30V or lower		DC24V±10%
Load current	200mA or lower	150mA or lower	5 to 20mA
Current consumption	10mA or lower when it is on at DC24V	16mA or lower when it is on at DC24V	—
Internal voltage drop	0.5V or lower at 150mA	0.5V or lower	6V or lower
Indicator light	Lit when LED is on	LED (Red/Green) (Lit when power is ON)	Red/Green LED is lit when switch is on
Leakage current	10 μA or lower		1.0mA or lower
Output delay time (ON delay, OFF delay) (Note 1)	—		30 to 60mS
Lead wire length (Note 1)	Standard 1 m (Oil-proof vinyl cabtyre cord, 3-wire, 0.2mm²)		Standard 1 m (Oil-proof vinyl cabtyre cord, 2-cord, 0.5mm²) (Note 2)
Shock resistance	980m/s²		
Insulation resistance	20 MΩ or more measuring with DC500V megger tester		100 MΩ or more measuring with DC500V megger tester
Withstand voltage	AC1,000V for 1 minute		
Ambient temperature	-10 to 60℃		
Product weight	For Grommet - IEC Standard IP67, JIS C 0920 (water tight type), Oil resistance		
Option	R※A (IP67) with terminal box, R※B (no water-proof) with terminal box		

Note 1 : This shows a period of time between detection of the magnet by the magnetic sensor and sending of switch output.

Note 2 : Non-flammable cabtyre cable available as option.

Discontinue

Type & Model / Item	Reed switch				
	R0			R4	
Applications	For use with relay, programmable controller			For use with high capacity relay, solenoid valve	
Load Voltage	DC12/24V	AC100V	AC200V	AC100V	AC200V
Load Current	5 to 50mA	7 to 20mA	7 to 10mA	20 to 200mA	10 to 200mA
Internal voltage drop	2.4V or lower			2V or lower	
Indicator light	Lit when LED is on			Lit when neon indicator light is off	
Leakage current	0mA			1mA or lower	
Lead wire length	1m (Oil-proof vinyl cabtyre cord, 2-wire, 0.3mm²)				
Shock resistance	294m/s²				
Insulation resistance	20 MΩ or more measuring with DC500V megger tester				
Withstand voltage	No abnormalities should occur after applying AC1,500V for 1 minute				
Ambient temperature	-10 to 60℃				
Degree of protection	For Grommet - IEC Standard IP67, JIS C0920 (water tight type), Oil resistance				
Option	R※A (IP67) with terminal box, R※B (no water-proof) with terminal box				

Type & Model / Item	Reed switch			
	R5			R6
Applications	For use with programmable controller, relay, IC circuit (without indicator light), series connection			For use exclusively with programmable controller (with DC self-holding function)
Load Voltage	DC12/24V	AC100V	AC200V	DC24V
Load Current	50mA or lower	20mA or lower	10mA or lower	5 to 50mA
Internal voltage drop	0V			5V or lower
Indicator light	Without			Lit when LED is on
Leakage current	0mA			0.1mA or lower
Lead wire length	1m (Oil-proof vinyl cabtyre cord, 2-wire, 0.3mm²)			
Shock resistance	294m/s²			
Insulation resistance	20 MΩ or more measuring with DC500V megger tester			
Withstand voltage	No abnormalities should occur after applying AC1,500V for 1 minute			
Ambient temperature	-10 to 60℃			
Degree of protection	For Grommet - IEC Standard IP67, JIS C0920 (water tight type), Oil resistance			
Option	R※A (IP67) with terminal box, R※B (no water-proof) with terminal box			