

Series 10-11-CQSX

Low speed cylinder
ø12, ø16, ø20, ø25

How to Order

• **Clean series**

10	Relief type
11	Vacuum suction type

10 — C D QSX B 20 — 30 D — M9B

• **Built-in magnet**

Nil	No
D	With auto switch (Built-in magnet)

• **Low speed cylinder**

• **Mounting**

B	Through-hole/Both ends tapped (Standard)
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• **Bore size**

12	12mm
16	16mm
20	20mm
25	25mm

• **Cylinder stroke (mm)**

Bore size (mm)	Standard stroke (mm)
12, 16	5, 10, 15, 20, 25, 30
20	5, 10, 15, 20, 25, 30, 35, 40, 45, 50
25	

• **Number of auto switches**

Nil	2 pcs.
S	1 pc.
n	n pcs.

• **Type of auto switch**

Reed switch	A93
Solid state switch	F9B, F91

• **Rod end thread**

Nil	Standard (Rod end female thread)
M	Rod end male thread

• **Action**

D	Double acting
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• **Manufacturing of intermediate stroke**
Intermediate strokes by the 1mm interval are available by using spacers with standard stroke cylinders. The overall length of cylinder will be the same as the standard stroke with a longer one.

Example) 10-CQSXB25-47D : Install a 3mm width spacer in a standard stroke cylinder, 10-CQSXB25-50D.



Model

Model		Bore size (mm)	Port size	Lubrication	Action	Standard stroke (mm)	Auto switch mounting	Cushion		
								Rubber	Air	
Relief type	10-CQSXB12	12	M5 x 0.8	Non-lube	Double acting single rod	5, 10, 15, 20, 25, 30	○	—	—	
	10-CQSXB16	16				5, 10, 15, 20, 25, 30, 35, 40, 45, 50				
	10-CQSXB20	20								
	10-CQSXB25	25								
Vacuum suction type	11-CQSXB12	12				5, 10, 15, 20, 25, 30, 35, 40, 45, 50				
	11-CQSXB16	16								5, 10, 15, 20, 25, 30
	11-CQSXB20	20								
	11-CQSXB25	25								

Specifications

Bore size (mm)		10- (Relief type)			
		12	16	20	25
Fluid		Air			
Proof pressure		1.5MPa			
Max. operating pressure		1.0MPa			
Min. operating pressure		0.04MPa		0.035MPa	
Ambient and fluid temperature		Without auto switch : -10 to 70°C (With no freezing)			
		With auto switch : -10 to 60°C (With no freezing)			
Piston speed		1 to 200 mm/s			
Piston rod diameter		ø6	ø8	ø10	ø12
Rod end thread	Female thread	M3 x 0.5	M4 x 0.7	M5 x 0.8	M6 x 1.0
	Male thread	M5 x 0.8	M6 x 1.0	M8 x 1.25	M10 x 1.25
Rod end thread tolerance		JIS Class 2			
Stroke tolerance		+1.0 0 mm			
Port size		M5 x 0.8			
Relief port		M5 x 0.8			
Grease		Fluorine grease			
Particle generation grade		Grade 2			

Bore size (mm)		11- (Vacuum suction type)			
		12	16	20	25
Fluid		Air			
Proof pressure		1.5MPa			
Max. operating pressure		1.0MPa			
Min. operating pressure		0.03MPa		0.025MPa	
Ambient and fluid temperature		Without auto switch : -10 to 70°C			
		With auto switch : -10 to 60°C			
Piston speed		1 to 200 mm/s		0.5 to 200 mm/s	
Piston rod diameter		ø6	ø8	ø10	ø12
Rod end thread	Female thread	M3 x 0.5	M4 x 0.7	M5 x 0.8	M6 x 1.0
	Male thread	M5 x 0.8	M6 x 1.0	M8 x 1.25	M10 x 1.25
Rod end thread tolerance		JIS Class 2			
Stroke tolerance		+1.0 0 mm			
Port size		M5 x 0.8			
Vacuum suction port		M5 x 0.8			
Grease		Fluorine grease			
Particle generation grade		Grade 1			
Suction flow rate (Reference values)		5 ℓ/min(ANR)			



External dimensions and applicable auto switches are the same as 10-/11- CQS. Please refer to pages 56 to 63.

Series 10-11-CQ2X

Low speed cylinder ø32, ø40, ø50, ø63

How to Order

● **Clean series**

10	Relief type
11	Vacuum suction type

10 — C D Q2XB 40 — 30 D [] J79 []

● **Built-in magnet**

Nil	No
D	With auto switch (Built-in magnet)

● **Low speed cylinder**

● **Bore size**

32	32mm
40	40mm
50	50mm
63	63mm

● **Cylinder stroke (mm)**

Bore size (mm)	Standard stroke (mm)
32, 40	5, 10, 15, 20, 25, 30, 35, 40, 45, 50, 75, 100
50, 63	10, 15, 20, 25, 30, 35, 40, 45, 50, 75, 100

● **Manufacturing of Intermediate Strokes**
Intermediate strokes by the 1 mm interval are available by using spacers with standard stroke cylinders.
Please contact us for ø40 with damper.

Example) 10-CQ2XB40-57D : Install an 18mm width spacer in a standard stroke cylinder, 10-CQ2XB40-75D.

● **Number of auto switches**

Nil	2 pcs.
S	1 pc.
n	n pcs.

● **Type of auto switch**

Reed switch	A73, A93
Solid state switch	J79, M9B, F79, M9N

● **Rod end thread**

Nil	Standard (Rod end female thread)
M	Rod end male thread

● **Action**

D	Double acting
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Model

Model		Bore size (mm)	Port size	Lubrication	Action	Standard stroke (mm)	Auto switch mounting	Cushion						
								Rubber	Air					
Relief type	10-CQ2XB32	32	M5 x 0.8, Rc1/8 ^{Note 1)}	Non-lube	Double acting single rod	5, 10, 15, 20, 25, 30, 35, 40, 45, 50, 75, 100	○	—	—					
	10-CQ2XB40	40	Rc1/8											
	10-CQ2XB50	50	Rc1/4			10, 15, 20, 25, 30, 35 40, 45, 50, 75, 100								
	10-CQ2XB63	63												
Vacuum suction type	11-CQ2XB32	32	M5 x 0.8, Rc1/8 ^{Note 1)}								5, 10, 15, 20, 25, 30, 35, 40, 45, 50, 75, 100			
	11-CQ2XB40	40	Rc1/8											
	11-CQ2XB50	50	Rc1/4								10, 15, 20, 25, 30, 35 40, 45, 50, 75, 100			
	11-CQ2XB63	63												

Note 1) In the case of ø32 without auto switch, M5 x 0.8 is used for 5 stroke only.

Specifications

Bore size (mm)		10- (Relief type)			
		32	40	50	63
Fluid		Air			
Proof pressure		1.5MPa			
Max. operating pressure		1.0MPa			
Min. operating pressure		0.035MPa		0.03MPa	
Ambient and fluid temperature		Without auto switch : -10 to 70°C (With no freezing)			
		With auto switch : -10 to 60°C (With no freezing)			
Piston speed		1 to 200 mm/s			
Piston rod diameter		ø16		ø20	
Rod end thread	Female thread	M8 x 1.25		M10 x 1.5	
	Male thread	M14 x 1.5		M18 x 1.5	
Rod end thread tolerance		JIS Class 2			
Stroke tolerance		$^{+1.0}_0$ mm			
Port size		M5 x 0.8, 1/8	1/8	1/4	
Relief port		M5 x 0.8			
Grease		Fluorine grease			
Particle generation grade		Grade 2			

Bore size (mm)		11- (Vacuum suction type)			
		32	40	50	63
Fluid		Air			
Proof pressure		1.5 MPa			
Max. operating pressure		1.0 MPa			
Min. operating pressure		0.025MPa		0.02MPa	
Ambient and fluid temperature		Without auto switch : -10 to 70°C (With no freezing)			
		With auto switch : -10 to 60°C (With no freezing)			
Piston speed		0.5 to 200 mm/s			
Piston rod diameter		ø16		ø20	
Rod end thread	Female thread	M8 x 1.25		M10 x 1.5	
	Male thread	M14 x 1.5		M18 x 1.5	
Rod end thread tolerance		JIS Class 2			
Stroke tolerance		^{+1.0} ₀ mm			
Port size		M5 x 0.8, 1/8	1/8	1/4	
Vacuum suction port		M5 x 0.8			
Grease		Fluorine grease			
Particle generation grade		Grade 1			
Suction flow rate (Reference values)		5 ℓ/min (ANR)		10 ℓ/min (ANR)	



External dimensions and applicable auto switches are the same as 10-/11- CQ2. Please refer to pages 64 to 71.

Series 10-11-CM2X

Low speed cylinder
Double acting single rod / ø20, ø25, ø32, ø40

How to Order

Clean series

10	Relief type
11	Vacuum suction type

Built-in magnet

Nil	No
D	With auto switch (Built-in magnet)

Low speed cylinder

Bore size

20	20mm
25	25mm
32	32mm
40	40mm

Cylinder stroke (mm)
Refer to the standard stroke table below.

Port thread type

Nil	Rc
TN	NPT
TF	G

Mounting style

B	Basic style
L	Axial foot style
F	Rod side flange style
G	Head side flange style
BZ	Boss-cut basic style
FZ	Boss-cut rod side flange style

Number of auto switches

Nil	2 pcs.
S	1 pc.
n	n pcs.

Type of auto switch

Reed switch	C73
Solid state switch	H7B, H7A1

Ordering Example: 10-C D M2X L 40 150 H7B



Model

Model		Bore size (mm)	Port size	Lubrication	Action	Standard stroke (mm)	Auto switch mounting	Cushion							
								Rubber	Air						
Relief type	10-CM2X□20	20	1/8	Non-lube	Double acting single rod	25, 50, 75, 100, 125 150, 200, 250, 300	○	○	—						
	10-CM2X□25	25													
	10-CM2X□32	32													
	10-CM2X□40	40	1/4												
Vacuum suction type	11-CM2X□20	20	1/8												
	11-CM2X□25	25													
	11-CM2X□32	32													
	11-CM2X□40	40	1/4												

Specifications

Bore size (mm)	10- (Relief type)				11- (Vacuum suction type)			
	20	25	32	40	20	25	32	40
Fluid	Air							
Proof pressure	1.5 MPa							
Max. operating pressure	1.0 MPa							
Min. operating pressure	0.035 MPa				0.025 MPa			
Ambient and fluid temperature	Without auto switch : −10°C to 70°C (With no freezing)							
	With auto switch : −10 to 60°C (With no freezing)							
Cushion	Rubber bumper							
Piston speed	1 to 200 mm/s				0.5 to 200 mm/s			
Piston rod diameter	ø8	ø10	ø12	ø14	ø8	ø10	ø12	ø14
Rod end thread	M8 x 1.25	M10 x 1.25		M14 x 1.5	M8 x 1.25	M10 x 1.25		M14 x 1.5
Rod end thread tolerance	JIS Class 2							
Stroke tolerance	^{+1.4} ₀ mm							
Port size	1/8			1/4	1/8			1/4
Vacuum suction port, Relief port	M5 x 0.8							
Grease	Fluorine grease							
Particle generation grade	Grade 2				Grade 1			
Suction flow rate (Reference values)	—				2 ℓ/min (ANR)			

 External dimensions and applicable auto switches are the same as 10-/11-CM2. Please refer to pages 15 to 20.



Specific Product Precautions

Be sure to read before handling.

Precautions

Warning

1. Do not rotate the cover.

When installing a cylinder or screwing a pipe fitting into the port, the coupling portion of the cover could break if the cover is rotated.

Caution

1. Be careful of the snap ring to pop out.

When replacing the rod seal, take care that the snap ring does not spring out while you are removing it.

Maintenance

Caution

1. Grease pack

Use the following part number to order grease for maintenance.

Grease pack
GR-X-005 (5g)



Actuator / Common Precautions 1

Be sure to read before handling. Refer to the main text for precautions for each series.

Precaution on designing

Warning

1. **There is a possibility of dangerous sudden action by air cylinders if sliding parts of machinery are twisted due to external forces, etc.**

In such cases, personal injury by catching hands or feet in the machinery, or damage to the machinery itself may occur. Therefore, the machine should be adjusted to operate smoothly and designed to avoid such dangers.

2. **A protective cover is recommended to minimize the risk of personal injury.**

If a driven object and moving parts of a cylinder are in close proximity, personal injury may occur. Design the structure to avoid contact with the human body.

3. **Securely tighten all stationary parts and connected parts so that they will not become loose.**

Particularly when a cylinder operates at a high frequency or is installed in a place where there is a lot of vibration, ensure that all parts remain secure.

4. **A deceleration circuit may be required.**

When a driven object is operated at high speed or the load is heavy, a cylinder's cushion will not be sufficient to absorb the impact. Install a deceleration circuit to reduce the speed before cushioning to relieve the impact.

In this case, the rigidity of the machinery should also be examined.

5. **Consider a possible drop in circuit pressure due to a power outage, etc.**

When a cylinder is used in a clamping mechanism, there is a danger of workpiece dropping if there is a decrease in clamping force due to a drop in circuit pressure caused by a power outage, etc. Therefore, safety equipment should be installed to prevent damage to machinery and personal injury. Suspension mechanisms and lifting devices also require consideration for drop prevention.

6. **Consider a possible loss of power source.**

Measures should be taken to avoid personal injury and equipment damage in the event that there is a loss of power to equipment controlled by pneumatics, electricity, or hydraulics.

7. **Design circuitry to prevent the sudden lurching of driven objects.**

When a cylinder is driven by an exhaust center type directional control valve or when it is started up after residual pressure is exhausted from the circuit, etc., the piston and its driven object will lurch when the cylinder is operated at high speed if pressure is applied to one side of the cylinder, due to the absence of air pressure inside the cylinder. Therefore, equipment should be selected and circuits should be designed to prevent this sudden lurching, because there is a danger of personal injury and/or damage to equipment when this occurs.

8. **Consider emergency stops.**

Design the machinery so that personal injury and/or damage to machinery and equipment will not occur when the machinery is stopped by a safety device under abnormal conditions, such as a power outage or a manual emergency stop.

9. **Consider the action when operation is restarted after an emergency stop or abnormal stop.**

Design the machinery so that personal injury or equipment damage will not occur upon restart of operation.

When the cylinder has to be reset at the start position, install safety manual control equipment.

Selection

Warning

1. **Confirm the specifications.**

The products featured in this catalog are designed for use in industrial compressed air systems. If the products are used in conditions where pressure and/or temperature are outside the range of specifications, damage and/or malfunctions may occur. Do not use in these conditions. (Refer to the specifications).

Please consult with SMC if you use a fluid other than compressed air.

2. **Intermediate Stops**

With a 3-position closed center type valve, it is difficult to accurately and precisely stop a piston at the required position in the same way as can be done with hydraulic pressure due to the compressibility of air.

Furthermore, since valves and cylinders, etc. are not guaranteed for zero air leakage, it may not be possible to hold a stopped position for an extended period of time. Please contact with SMC when it is necessary to hold a stopped position for an extended period of time.

Caution

1. **Operate within the limits of the maximum feasible stroke.**

Operation that exceeds the maximum stroke may damage a piston rod. Refer to the air cylinder model selection procedures for the maximum feasible strokes.

2. **Operate a cylinder within a range such that collision damage will not occur to a piston at the stroke end.**

Operate a cylinder within a range so that a piston having inertial force will not be damaged when it collides against the cover at the stroke end. Refer to the air cylinder model selection procedures for the maximum feasible strokes.

3. **Use a speed controller to adjust the cylinder speed, gradually increasing from a low speed to the desired speed setting.**

4. **Provide intermediate supports for long stroke cylinders.**

An intermediate support should be provided in order to prevent damage to a long stroke cylinder, due to problems such as sagging of the rod, deflection of the cylinder tube, vibration and external load.



Actuator / Common Precautions 2

Be sure to read before handling. Refer to the main text for precautions for each series.

Mounting

Caution

1. **Be certain to match the rod shaft center with the load and direction of movement when connecting.**

When not properly matched, problems may arise with the rod and tube, and damage may be caused due to friction on areas such as the inner tube surface, bushings, rod surface, and seals.

2. **When using an external guide, connect the rod end and the load in such a way that there is no interference at any point within the stroke.**

3. **Do not scratch or gouge the sliding portion of the cylinder tube or the piston rod by striking it with an object, or squeezing it.**

The tube bore is manufactured under precise tolerances. Thus, even a slight deformation could lead to a malfunction.

Moreover, scratches or gouges, etc. in the piston rod may lead to damaged seals and cause air leakage.

4. **Do not use until you verify that the equipment can operate properly.**

After mounting, repairs, or modification, etc., connect the air supply and electric power, and then confirm proper mounting by means of appropriate function and leak tests.

5. **Instruction manual**

Install the products and operate them only after reading the instruction manual carefully and understanding its contents.

Also keep the manual where it can be referred to as necessary.

Cushion

Caution

1. **Readjust with a cushion needle.**

Cushions are adjusted at the time of shipment; however, the cushion needle on the cover should be readjusted, when the product is put into service based on factors such as the size of the load and the operating speed. When the cushion needle is turned clockwise, the restriction becomes smaller and the cushion's effectiveness is increased. Tighten the lock nut securely after adjustment is performed.

2. **Do not operate the actuator with the cushion needle fully closed.**

This could damage the seals.

Air Supply

Warning

1. **Use clean air.**

Do not use compressed air which contains chemicals, synthetic oil containing organic solvents, salts or corrosive gases, etc. as this may cause damage or malfunction.

Caution

1. **Install air filters.**

Install air filters close to valves at their upstream side. A filtration degree of 5 μ m or less should be selected.

2. **Install an aftercooler, air dryer, or water separator (Drain Catch).**

Compressed air that includes excessive drainage may cause malfunction of valves and other pneumatic equipment. To prevent this, install an air dryer, aftercooler or water separator (drain catch), etc.

3. **Use the product within the specified range of fluid and ambient temperature.**

Take measures to prevent freezing at temperature below 5°C, since moisture in circuits may freeze and cause damage to seals and lead to malfunctions.



Actuator / Common Precautions 3

Be sure to read before handling. Refer to the main text for precautions for each series.

Operating Environment

Warning

1. Do not use in atmospheres or locations where corrosion hazards exist.
Refer to the construction drawings regarding cylinder materials.
2. In locations where ultrapure water or cleaning solvent, etc. splashes on the equipment, take suitable measures to protect the rod.

Maintenance

Warning

1. Perform maintenance procedures as shown in the instruction manual.
Improper handling may result in malfunction and damage of machinery or equipment.
2. Removal of equipment, and supply / exhaust of compressed air
Before any machinery or equipment is removed, first ensure that the appropriate measures are in place to prevent the fall or erratic movement of driven objects and equipment, then cut off the electric power and release the compressed air in the system.
When machinery is restarted, proceed with caution after confirming that appropriate measures are in place to prevent cylinders from sudden movement.

Caution

1. Drain flushing
Remove drainage from air filters regularly.



Auto switch / Common Precautions 1

Be sure to read before handling. Refer to the main text for precautions for each series.

Design/Selection

Warning

1. Confirm the specifications.

Read the specifications carefully and use this product appropriately. The product may be damaged or malfunction if it is used outside the specifications of current voltage, temperature or impact.

2. Use caution when multiple cylinders are used in close proximity to each other.

When two or more auto switch cylinders are lined up in close proximity to each other, magnetic field interference may cause the switches to malfunction. Maintain a minimum cylinder separation of 40mm. (When the allowable interval is specified for each cylinder series, use the indicated value.)

3. Use caution to the ON time of a switch at the intermediate position of stroke.

When an auto switch is placed at an intermediate position of the stroke and a load is driven at the time the piston passes, the auto switch will operate, but if the speed is too fast, the operating time will be shortened and the load may not operate properly. The maximum detectable piston speed is :

$$V \text{ (mm/s)} = \frac{\text{Auto switch operation range (mm)}}{\text{Load operating time (ms)}} \times 1000$$

In cases of high piston speed, the use of an auto switch (D-F5NT, F7NT, G5NT and M5□T) with a built-in OFF delay timer (approx. 200ms) makes it possible to extend the load operating time.

4. Wiring should be kept as short as possible.

<Reed switch>

As the length of the wiring to a load gets longer, the rush current at switching ON becomes greater, and this may shorten the product's life. (The switch will stay ON all the time).

- 1) For an auto switch without a contact protection circuit, use a contact protection box when the wire length is 5m or longer.
- 2) Even if an auto switch has a built-in contact protection circuit, when the wiring is more than 30m long, it is not able to adequately absorb the rush current and its life may be reduced. It is again necessary to connect a contact protection box in order to extend its life. Please contact SMC in this case.

<Solid state switch>

- 3) Although wire length should not affect switch function, use a wire 100m or shorter.

5. Use caution to internal voltage drop of a switch.

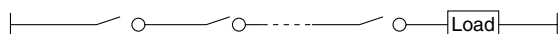
<Reed switch>

1. Switches with an indicator light (except D-A56/A76H/ A96/A96 V/C76/E76A/Z76)

- If auto switches are connected in series as shown below, please note that there will be a large voltage drop because of internal resistance in the light emitting diodes. (Refer to internal voltage drop in the auto switch specifications.)

- [The voltage drop will be "n" times larger when "n" auto switches are connected.]

The load may be ineffective even though the auto switch function is normal.



- Similarly, when operating below a specified voltage, it is possible that the load may be ineffective even though the auto switch function is normal. Therefore, the formula below should be satisfied after confirming the minimum operating voltage of the load.

Power voltage – Internal voltage drop of switch > Minimum operating voltage of load

- 2) If the internal resistance of a light emitting diode causes a problem, select a switch without an indicator light (D-A6□, A80, A80H, A90, A90V, C80, R80, 90, E80A, Z80).

<Solid state switch>

- 3) Generally, the internal voltage drop will be greater with a 2-wire solid state auto switch than with a reed switch. Take the same precautions as in 1).

Also please note that a 12VDC relay is not applicable.

6. Use caution to the leakage current.

<Solid state switch>

With a 2-wire solid state auto switch, current (leakage current) flows to the load to operate the internal circuit even when in the OFF state.

Current to operate load (OFF condition) > Leakage current
If the condition given in the above formula is not met, it will not reset correctly (stays ON). Use a 3-wire switch if this specification cannot be satisfied.

Moreover, leakage current flow to the load will be "n" times larger when "n" auto switches are connected in parallel.

7. Do not use a load that generates surge voltage.

<Reed switch>

When driving a load such as a relay that generates a surge voltage, use a switch with a built-in contact protection circuit or a contact protection box.

<Solid state switch>

Although a zener diode for surge protection is connected to the output side of a solid state auto switch, damage may still occur if the surge is applied repeatedly. When a load, such as a relay or solenoid, which generates surge is directly driven, use a type of switch with a built-in surge absorbing element.

8. Cautions for use in an interlock circuit

When an auto switch is used for an interlock signal requiring high reliability, devise a double interlock system to avoid trouble by providing a mechanical protection function, or by also using another switch (sensor) together with the auto switch.

Also perform periodic maintenance inspections and confirm proper operation.

9. Ensure sufficient space for maintenance activities.

When designing an application, be sure to allow sufficient space for maintenance and inspection.



Auto switch / Common Precautions 2

Be sure to read before handling. Refer to the main text for precautions for each series.

Mounting/Adjustment

Warning

1. Do not drop or bump.

Do not drop, bump, or apply excessive impacts (300m/s² or more for reed switches and 1000m/s² or more for solid state switches) while handling. Although the body of the switch may not be damaged, the inside of the switch could be damaged and cause a malfunction.

2. Do not carry a cylinder by the auto switch lead wires.

Never carry a cylinder by its lead wires. This may not only cause broken lead wires, but it may cause internal elements of the switch to be damaged by the stress.

3. Mount switches using the proper tightening torque.

When a switch is tightened beyond the range of tightening torque, the mounting screws or switch may be damaged.

On the other hand, tightening below the range of tightening torque may allow the switch to slip out of position.

4. Mount a switch at the center of the operating range.

Adjust the mounting position of an auto switch so that the piston stops at the center of the operating range (the range in which a switch is ON). (The mounting positions shown in the catalog indicate the optimum position at the stroke end.) If mounted at the end of the operating range (around the borderline of ON and OFF), the operation will be unstable.

<D-M9□>

If this auto switch replaces the conventional model, it may not function depending on the application (shown below) because its operation range is shorter.

- Applications where at the end, the stopping position shifting range is larger than the operation range

e.g. Workpiece pushing, pressing into a hole, or clamping

- Applications where an auto switch is used to detect intermediate stopping positions (Detecting time is shortened).

As indicated above, mount a switch at the center of the operating range.

Wiring

Warning

1. Avoid repeatedly bending or stretching lead wires.

Broken lead wires will result from repeatedly applying bending stress or stretching force to lead wires.

2. Be sure to connect the load before power is applied.

<2-wire type>

If the power is turned on when an auto switch is not connected to a load, the switch will be instantly damaged because of excess current.

3. Confirm proper insulation of wiring.

Be certain that there is no faulty wiring insulation (contact with other circuits, ground fault, improper insulation between terminals, etc.). Damage may occur due to excess current flow into a switch.

4. Do not wire with power lines or high voltage lines.

Wire separately from power lines or high voltage lines, avoiding parallel wiring or wiring in the same conduit with these lines. Control circuits, including auto switches, may malfunction due to

Wiring

Warning

5. Do not allow short circuiting of loads.

<Reed switch>

If the power is turned on with a load in a short circuited condition, the switch will be instantly damaged because of excess current flow into the switch.

<Solid state switch>

Models M-F9□(V), F9□W(V), J51, G5NB and all models of PNP output switches do not have built-in short circuit prevention circuits. If loads are short circuited, the switches will be instantly damaged.

Use caution to avoid reverse wiring with the brown power supply line and the black output line on 3-wire type switches.

6. Avoid incorrect wiring.

<Reed switch>

A 24VDC switch with indicator light has polarity. The brown lead wire or terminal No.1 is (+), and the blue lead wire or terminal No.2 is (-).

[In the case of model D-97, the side without indicator is (+) and the blue line side is (-).]

1) If connections are reversed, a switch will operate, however, the light emitting diode will not light up.

Also please note that a current greater than the maximum specified one will damage a light emitting diode and make it inoperable.

Applicable models

D-A73, A73H, A73C, C73, C73C, E73A, Z73, R73

D-97, 93A, A93, A93V

D-A33, A34, A33A, A34A, A44, A44A

D-A53, A54, B53, B54

2) However, when using a 2 color indication auto switch (D-A79W, A59W, B59W), be aware that the switch will constantly remain ON if the connections are reversed.

<Solid state switch>

1) If connections are reversed on a 2-wire type switch, the switch will not be damaged if protected by a protection circuit, but the switch will always stay in an ON state. However, it is still necessary to avoid reversed connections, since the switch could be damaged by a load short circuit in this condition.

2) If connections are reversed (power supply line (+) and power supply line (-) on a 3-wire type switch, the switch will be protected by a protection circuit. However, if the power supply line (+) is connected to the blue wire and the power supply line (-) is connected to the black wire, the switch will be damaged.

<D-M9□>

D-M9□ does not have built-in short-circuit prevention circuits. Reverse connection of power supply line (+) and (-) may damage the switch.



Auto switch / Common Precautions 3

Be sure to read before handling. Refer to the main text for precautions for each series.

Environment

Warning

1. Never use in the presence of explosive gases.

Our auto switches are not explosion proof. Never use them in the presence of explosive gas, as this may cause a serious explosion.

2. Do not use in an area where a magnetic field is generated.

Auto switches will malfunction or magnets inside cylinders will become demagnetized. (Please consult with SMC regarding the availability of a magnetic field resistant auto switch.)

3. Do not use in environments where the auto switches will be constantly exposed to water.

Although switches except D-A3□/A44□/G39□/K39□ satisfy the IEC standard IP67 structure (JIS C 0920: anti-immersion structure), do not use switches in applications where continually exposed to water splash or spray. Poor insulation or swelling of the potting resin inside switches may cause malfunction.

4. Do not use in environments with oil or chemicals.

Please consult with SMC if auto switches will be used in an environment with coolants, cleaning solvents, various oils or chemicals. If auto switches are used under these conditions for even a short time, they may be adversely affected by improper insulation, a malfunction due to swelling of the potting resin, or hardening of the lead wires.

5. Do not use in environments with temperature cycles.

Please consult with SMC if switches are to be used where there are temperature cycles other than normal temperature changes, as they may be adversely affected internally.

6. Do not use in environments where there is excessive impact shock.

<Reed switch>

When excessive impact (300 m/s² or more) is applied to a reed switch during operation, the contact point may malfunction and generate or cut off a signal momentarily (1ms or less). Please consult with SMC regarding the need to use a solid state switch depending on the environment.

7. Do not use in locations where surges are generated.

<Solid state switch>

When there are units (solenoid type lifters, high frequency induction furnaces, motors, etc.) which generate a large amount of surge in the area around cylinders with solid state auto switches, this may cause deterioration or damage to the switches. Avoid sources of surge generation and crossed lines.

8. Avoid close contact with magnetic substances.

When a magnetic substance (substance attracted by a magnet) is brought into close proximity with an auto switch cylinder, it may cause the auto switches to malfunction due to a loss of the magnetic force inside the cylinder.

Maintenance

Warning

1. Perform the following maintenance periodically in order to prevent possible danger due to unexpected auto switch malfunction.

1) Securely tighten switch mounting screws.

If screws become loose or the mounting position is dislocated, retighten screws securely after readjusting the mounting position.

2) Confirm that there is no damage to lead wires.

To prevent faulty insulation, replace switches or repair lead wires if damage is discovered.

3) Confirm that the green light on the 2-color indicator type switch lights up.

Confirm that the green LED is ON when stopped at the set position. If the red LED is ON when stopped at the set position, the mounting position is not appropriate. Readjust the mounting position until the green LED lights up.

Other

Warning

1. Please consult with SMC concerning water resistance, elasticity of lead wires, etc.

*Lead wire color changes

Lead wire colors of SMC auto switches have been changed in order to meet NECA (Nippon Electric Control Equipment Industries Association) Standard 0402 for production beginning September, 1996 and thereafter. Special care should be taken regarding wire polarity during the time that both old and new colors exist.

2-wire system

	Old	New
Output (+)	Red	Brown
Output (-)	Black	Blue

3-wire system

	Old	New
Power supply +	Red	Brown
Power supply GND	Black	Blue
Output	White	Black

Solid state with diagnostic output

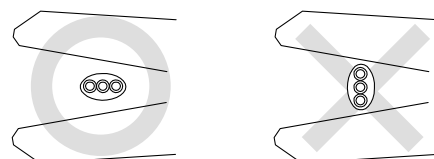
	Old	New
Power supply +	Red	Brown
Power supply GND	Black	Blue
Output	White	Black
Diagnostic output	Yellow	Orange

Solid state with latch type diagnostic output

	Old	New
Power supply +	Red	Brown
Power supply GND	Black	Blue
Output	White	Black
Latch type diagnostic output	Yellow	Orange

Caution

1. When stripping the cable clad, take care with the orientation of the cable being stripped. The insulator may accidentally be torn or damaged depending on the orientation.(D-M9□ only)



Recommended tools are shown below.

Manufacturer	Model name	Model no.
VESSEL	Wire stripper	No 3000G
TOKYO IDEAL	Strip master	45-089

* Stripper for round cable (ø2.0) can be used for a 2-wire type cable.