Pneumatic components

Safety Precautions

Always read this section before use.
Refer to page 2 for general information of the cylinder and to page 320 for general information of the cylinder switch.

Product-specific cautions: Round shaped cylinder SCM Series

Design & selection

1.Common

CAUTION

■ As a cushion mechanism integrated in the cylinder, the rubber cushion and the air cushion are available. The purpose of the air cushion is to absorb the piston's kinetic energy by using air compressibility, avoiding collisions of piston and cover at the stroke end. Thus, the cushion is not used to decelerate the piston speed (deceleration action) near the stroke end. The following table shows the kinetic energy that can be absorbed by the cushion. If the kinetic energy exceeds these values, or if bounding caused by the air compressibility is to be avoided, use a separate buffer.

Bore size (mm)	Rubber cushion	Air cushion	
	Allowable energy absorption J	Effective cushion length (mm)	Allowable absorbed energy J
ø20	0.1	8.1	0.8
ø25	0.2	8.1	1.2
ø32	0.5	8.6	2.5
ø40	0.9	8.6	3.7
ø50	1.6	13.4	8.0
ø63	1.6	13.4	14.4
ø80	3.3	15.4	25.4
ø100	5.8	15.4	45.6

Kinetic energy (J) =

$$\frac{1}{2} \times \text{Weight (kg)} \times (\text{Speed [m/s]})^2$$

Note: Calculating kinetic energy
Average cylinder speed is obtained with $Va = \frac{L}{T}$.

Va : Average speed (m/s)
L : Cylinder stroke length (m)
T : Operation time (s)

With respect to this, the cylinder speed just before rushing into the cushion can be obtained with the following simple formula.

$Vm = \frac{L}{T} \times (1 + 1.5 \times \frac{\omega}{100})$

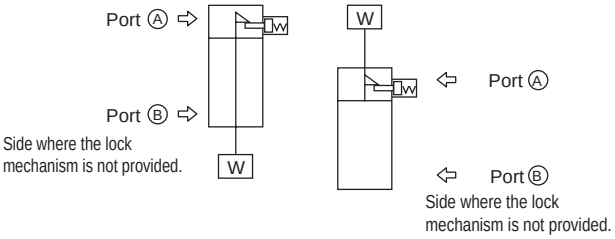
Vm: Stroke end speed (m/s)
ω : Cylinder load factor (%)

Use this Vm value as speed to calculate kinetic energy.

2.Position locking SCM-Q

WARNING

■ If pressure is applied to the port Ⓐ when both ports are not pressurized and the piston is locked, the lock may not be released or the piston rod may suddenly pop out just after the lock is released. This can be extremely hazardous. To release the locking mechanism, be sure to supply pressure to port Ⓑ . Check that a load is not applied to the locking mechanism upon release.



■ For usage where the drop rate is increased using the quick exhaust valve, the lock may not release normally because the cylinder body starts operating before the lock pin. For the position locking cylinder, do not use the quick exhaust valve.

■ Do not use 3-position valves.
Do not use the cylinder by combining with the 3-position (especially, closed center metal seal) valves. If the port at the side where the lock mechanism is provided is pressurized, the lock cannot be engaged. Even if it is locked once, the air leaked from the valve enters the cylinder, and the lock may be released after a certain period of time.

CAUTION

■ Cylinder load factor must be 50% or less.
If the load factor is high, the lock may not be released, or the lock section may be damaged.

■ If back pressure is applied to the locking mechanism, the lock may be released. Use a single valve, or an individual exhaust manifold.

■ Do not use multiple synchronized cylinders.
Do not use so that 1 workpiece is moved by synchronizing 2 or more position locking cylinders. Cylinder lock release may fail.

Mounting, installation & adjustment

1.Common

⚠CAUTION

■Switch rails are adhered with industrial adhesive tape. If used in an atmosphere containing inorganic or organic solvents or water vapor, rails may become loose. Main inorganic solvent/organic solvent

Inorganic solvents: Sodium hydroxide, hydrochloric acid, etc.
Organic solvents: Toluene, ethanol, hexane, gasoline, kerosene, etc.

■Remove all oil, moisture, dust, etc., from the body (tube) in order to adhere the switch rail.

(Perform adhesion by referring to instructions attached to the part.)

■Caution for air cushion

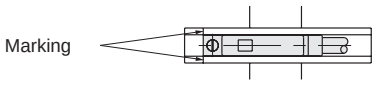
For ø20 and ø25, compatible fittings are limited, so see the following table to select the fitting.

Descriptions	Port diameter	Applicable fittings		Inapplicable fittings
ø20	M5	SC3W-M5-4・6-P7*		GWL6-M5
		SC3R-M5-P7*		
		GWS4-M5-P7*	GWS4-M5-S-P7*	
ø25		GWS6-M5-P7*	GWS6-M5-S-P7*	GWL6-M5-45
		GWL4-M5-P7*	GWL4-M5-45-P7*	
		GWL4-M5-T-P7*	GWL6-M5-T-P7*	

■Switch mounting: Caution for band

● When moving the switch position to the stroke length direction

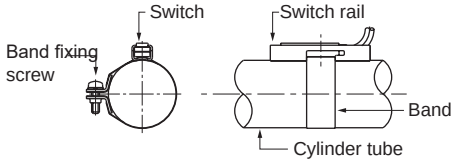
The 1-color display switch can be fine-tuned by ±3 mm from the default. Loosen the switch fixing screw, shift the switch along the rail, then tighten at the specified position. If the adjusting range exceeds ±3 mm, or when finetuning the 2-color display switch, move the band position.
When using T2, T3, T0, or T5, use a flathead screwdriver (clockwork screwdriver, precision screwdriver, etc.) with a grip diameter of 5 to 6 mm, a 2.4 mm or smaller tip, and a thickness of 0.3 mm or less to tighten the screws with a tightening torque of 0.1 to 0.2 N·m.
When using T2J, T2Y, or T3Y, tighten the screw with a tightening torque of 0.5 to 0.7 N·m.
The switch bracket rail has a marking 4 mm from the rail end. Use as a guide to the mounting position when replacing the switch.
Switch rail markings are set to the default switch max. sensitivity position.
The max. sensitivity position will change when the switch is changed or when the band is shifted. Adjust the position accordingly in this case.



● If moving the switch position in the circumferential direction, loosen the band fixing screw, shift the switch rail in the circumferential direction, then tighten at the specified position.
Tightening torque is 0.6 to 0.8 N·m.

● Shifting the band position

Loosen the band fixing screw, shift the switch rail and band along the cylinder tube, and tighten the screw at the specified position. Tightening torque is 0.6 to 0.8 N·m.



Position locking SCM-Q

⚠CAUTION

■For the axial foot (mounting style: LB), when trying to fix the cylinder to a support, etc., with the state that the mounting bracket is attached to the cylinder, the cylinder cannot be fixed because the bolt and the stopper cover will interfere with each other. Fix the mounting bracket at the position locking side to the support, etc., first, and then mount the cylinder.

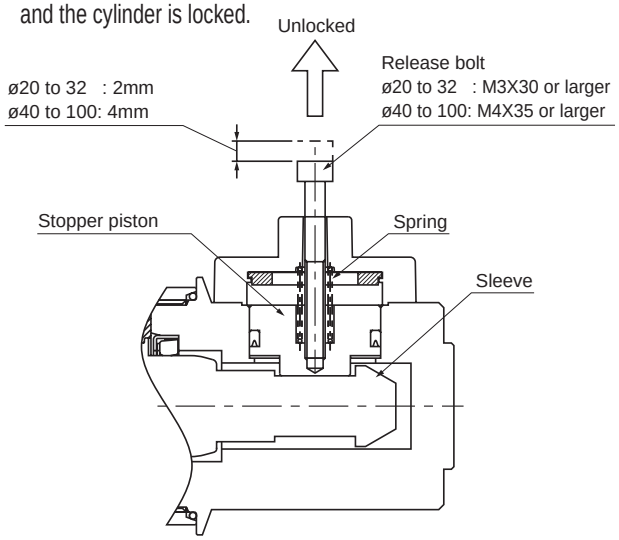
■The lock mechanism functions at the stroke end, so that if the stopper is engaged during the stroke by the external stopper, the lock mechanism may not work and the piston could fall. When setting a load, make sure to check that the lock mechanism functions before installing the product.

■Supply pressure equal to or higher than the min. working pressure to the port on the lock mechanism side.

■When the piping at the side where the lock mechanism is provided is long and thin, or when the speed controller is far away from the cylinder port, note that it takes time to engage the lock. Clogging in the silencer mounted on the EXH port of the valve may cause the same result.

■Manual operation unlocking method

By screwing the bolt (ø20 to 32: M3X30 and over, ø40 to 100: M4X35 and over) into the stopper piston and pulling the bolt 2 mm (ø20 to 32) or 4 mm (ø40 to 100) with force of 20 N or more, the stopper piston is moved and the lock is released. When released, the stopper piston is returned to the original position by the built-in spring and engaged in the sleeve groove, and the cylinder is locked.



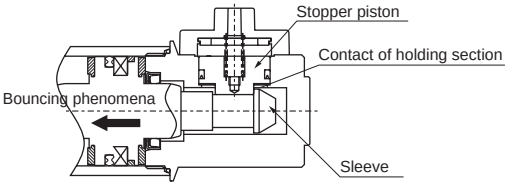
During use & maintenance

1.Position locking SCM-Q

⚠WARNING

■ For safety purposes, prevent the load from dropping under its own weight during maintenance.

■ In the case of the cylinder with air cushion, if the air cushion needle at the lock mechanism side is tightened excessively, the piston bounds at the stroke end and the sleeve and stopper piston collide strongly, which may result in damage to the locking mechanism. Also, if the air cushion needle is opened too much, the piston bounces off at the stroke end, which may similarly damage the mechanism. Adjust the needle of the air cushion so that there is no bound.



When stopping the piston with an external buffer device (shock absorber, etc.), adjust it similarly so that there is no bound.
Inspect the piston once or twice a year to make sure there is no damage to the retainer caused by this phenomenon.

⚠CAUTION

■ After the lock mechanism is manually operated, make sure to return the lock mechanism to the original state before use. Do not perform manual operation except for adjustment, as it is dangerous.

■ When mounting or adjusting the cylinder, release the lock.
If mounting work, etc., is done while the lock is engaged, the lock part may be damaged.

■ Use the speed controller with meter-out.
If the meter-in control is used, the lock may not be able to be released.

■ At the side where the lock mechanism is attached, be sure to use the cylinder from the stroke end.
If the cylinder piston does not reach the stroke end, the lock may not be engaged or the lock may not be able to be released.

■ If you perform vacuum treatment of the relief port equipped with the positioning lock mechanism, it will become disabled, which is very dangerous. Do not perform vacuum treatment of the port.