Safety Precautions

Be sure to read this section before use.
Refer to Intro Page 73 for general information of the cylinder, and to Intro Page 80 for general information of the cylinder switch.

Product-specific cautions: Tie rod cylinders SCG Series

Design/selection

1. Common

⚠CAUTION

■Mount a speed controller on the cylinder.
Mount the speed controller on the cylinder.
Use within the working piston speed range of each series.

⚠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 bouncing caused by the air compressibility is to be avoided, consider using another shock absorber.

Bore size (mm)	Rubber cushion	Air cushion	
	Allowable absorbed energy J	Effective air cushion length (mm)	Allowable absorbed energy J
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

$$\text{Kinetic energy (J)} = \frac{1}{2} \times \text{Weight (kg)} \times \{\text{Speed (m/s)}\}^2$$

(Note) Calculating kinetic energy

Average cylinder speed is obtained with $Va = \frac{L}{T}$.

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

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

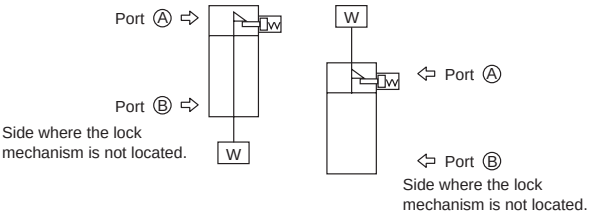
$$Vm = \frac{L}{T} \times \left(1 + 1.5 \times \frac{\omega}{100}\right)$$

Vm: Speed just before rush into cushion (m/s)
ω : Cylinder load factor (%)
Use this Vm value as speed to calculate kinetic energy.

2. Position locking SCG-Q

⚠WARNING

■If pressure is supplied 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 lock mechanism, make sure to supply pressure to port Ⓑ. Check that load is not applied to the lock mechanism.



■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 manual exhaust.

■Do not use 3-position valves.
Do not use the cylinder in combination with 3-position (especially closed center metal seal) valves. If the port at the side where the lock mechanism is located is pressurized, the lock cannot be engaged. Even if it is locked once, the air leaked from the solenoid valve may enter 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 solenoid 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. Lock release may fail for one of the cylinders.

3. Low friction SCG-U

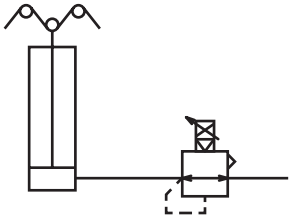
⚠WARNING

■Durability differs based on working conditions and model characteristics.
This cylinder has internal leakage.
Refer to specifications (page 402) for amount of leakage.

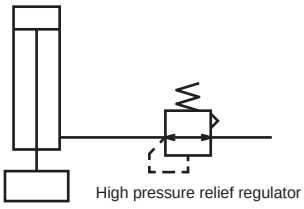
⚠CAUTION

■When using the cylinder for a balancer, etc., it may be advisable not to mount a speed controller in order to improve the supply and exhaust efficiency. Depending on the application, circuits ⓐto ⓒbelow are recommended.

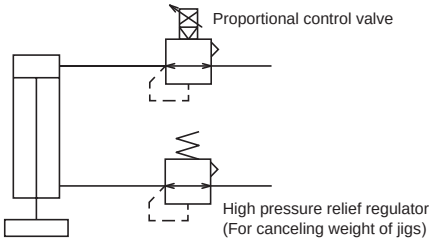
ⓐTension control
(winding machine, etc.)



ⓑ Balancer
(processing machine Z-axis, etc.)



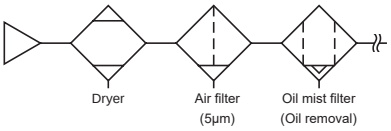
ⓒLoad control (grinding, etc.)



* To improve the supply and exhaust efficiency, make the volume of piping as large as possible.

■Do not lubricate. The properties fluctuate.

■Because poor quality air worsens the characteristics and adversely affects the durability, use clean air with the piping below.



■Mount the speed controller near the cylinder.
When installed at a distant place from the cylinder, the adjustment becomes unstable.

■In general, the speed is more stable at higher air pressure and lower load factor.
Use at a 50% or less load factor.

4. Coolant proof SCG-G2/G3

⚠CAUTION

■Do not apply an eccentric load to the piston rod. The service life of the scraper or bearing could be shortened.

■In the case that the G2 or G3 Series are not exposed to splattering of coolant or water, the lubrication of the piston rod will run out and the service life will be shortened. Use the G Series in this case.

5. Anti-spatter adherence SCG-G4

⚠WARNING

■The durability of this cylinder series is improved in comparison to standard cylinders when used in an atmosphere exposed to spatter. But durability may be shorter than the standard cylinder when used in other atmospheres.

Mounting, installation and adjustment

1. Common

⚠CAUTION

Caution for mounting the switch

■Fixing the switch

For screw fixing 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.

2. Position locking SCG-Q

⚠CAUTION

■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 located, 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.

3. Low friction SCG-U

⚠CAUTION

■Do not apply a lateral load to the cylinder.
Install the sliding guide so that it is not twisted.
- When the load or the resistance fluctuates, operation becomes unstable.
- For the long stroke, the piston rod's own weight causes the speed to become unstable. Install the guide before use.
- With a large difference between static friction and kinematic friction of the guide, operation becomes unstable.

■Avoid using this product where vibration is present.
- The product will be adversely affected by vibration and operation will become unstable.

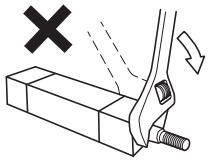
■Avoid using in environments with water vapor or high humidity or in alkaline atmospheres.

4. Rotation-stop SCG-M

⚠CAUTION

■Do not use the product so as to apply rotation torque to the piston rod.
The bushing for the rotation lock may deform and significantly shorten the service life.

■When fixing a workpiece onto the tip of the piston rod, retract the piston rod to the stroke end and apply a wrench to the section protruding from the rod's parallel section. Tighten so that torque is not applied to the cylinder body.



■For the rotation-stop cylinder, the rotation torque that can be applied to the piston rod when fixing the workpiece on the end of the piston rod is as shown in the table below.
Note that the piston rod starts to spin around if the rotation torque exceeding this value is applied to the piston rod.

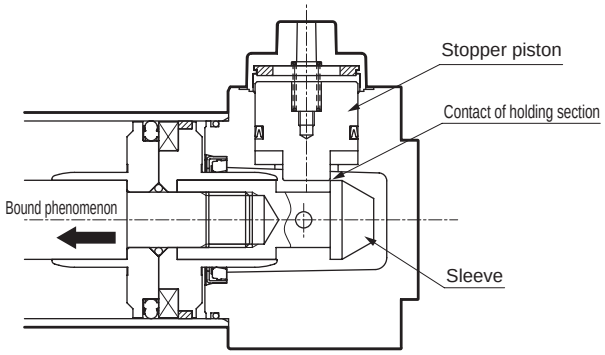
Allowable torque	ø32	ø40	ø50	ø63
N·m	0.25	0.45	0.45	0.45

Use/maintenance

1. Position locking SCG-Q

⚠ WARNING

- For safety purposes, prevent the load from falling 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.

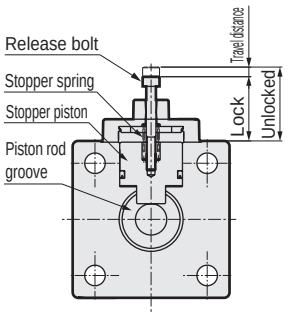


When stopping the piston with an external buffer device (shock absorber, etc.), adjust it similarly so that there is no bound.
Inspect the piston once or twice a year to make sure there is no damage to the retainer caused by this phenomenon.

⚠ CAUTION

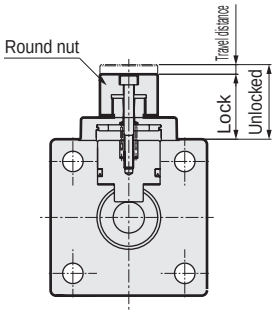
- After the lock mechanism is manually operated, make sure to confirm manual operation and return the mechanism to the original state before use. Do not perform manual operation except for adjustment, as it is dangerous.
- When mounting or adjusting the cylinder, release the lock.
  If mounting work, 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.

- Manual override non-locking release method
  By screwing the release bolt into the stopper piston and pulling the bolt with a force of 20N or more for the distance traveled, the stopper piston will move and the lock will release. (when horizontally installed with no load or with the opposite side port pressurized). When the screw is released, the internal spring causes the stopper piston to return. When it fits into the piston rod groove again, the piston is locked.



Bore size (mm)	Lock	Unlocked	Travel distance	Release bolt
ø32	19.5	22.5	3	M3x25
ø40	18	21	3	M3x25
ø50	26.5	30.5	4	M4x35
ø63	21.5	25.5	4	M4x35
ø80	19	23	4	M4x35
ø100	21.5	25.5	4	M4x35

- Manual override locking release method
  By rotating the round nut leftward (counterclockwise), the stopper piston moves and the lock is released.
  Rotating the round nut to the right to set it in the locked position causes the stopper piston to return. When it fits into the piston rod groove again, the piston is locked.



Bore size (mm)	Lock	Unlocked	Distance traveled
ø32	20	23	3
ø40	18.5	21.5	3
ø50	27	31	4
ø63	22	26	4
ø80	19.5	23.5	4
ø100	22	26	4

2. Low friction SCG-O

⚠ WARNING

- Smoking with hands smeared with the fluorine grease used for the O Series could generate harmful gases and cause physical harm.

3. Low friction SCG-U

⚠ CAUTION

- Do not disassemble the product. Once disassembled, the performance may not be retained.
  For this product, just the repair parts are not available.