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: High precision guided rodless cylinder SRM3 Series

Design/selection

1. Common

CAUTION

■ Pay attention when designing the brake control circuit.
A slight amount of external leakage is inherent to the structure of SRL3 and other slit rodless cylinders. Therefore, brake control using a 3-position valve with all ports closed may fail to keep the stop position of the table. Use the control circuit with both sides pressurized with 3-position P/A/B connection valve. However, note that the table may deviate from origin if air pressure is applied in the de-energized state when starting after a pressure drop.

■ Basic circuit diagram

● Horizontal load
When piping is as shown in Fig. 1, equal pressure is applied to both ends of the piston when stopped to prevent the table from popping out when operation is restarted.

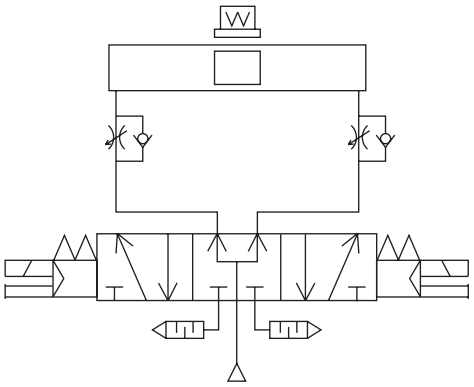


Fig. 1

● Vertical load
When vertical load works as shown in Figure 2, the table moves in the load direction. Install a regulator with check valve on the top to reduce thrust in the load direction to balance the load.

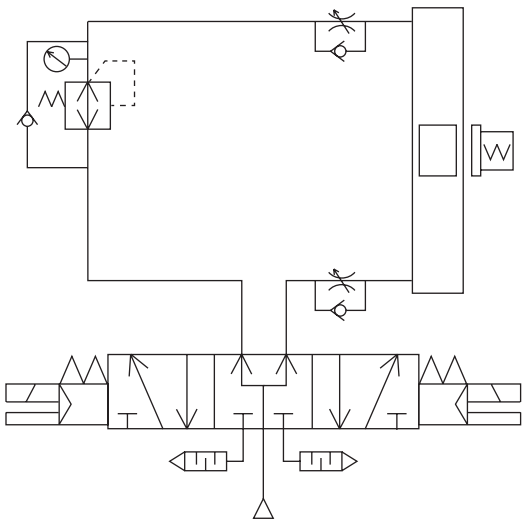
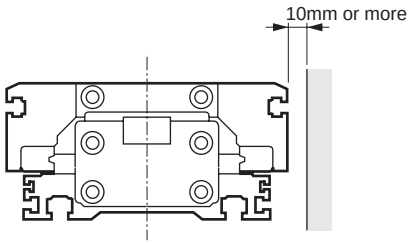


Fig. 2

■ The cylinder switch may malfunction if there is a magnetic substance such as a metal plate installed adjacently. Check that a distance of 10 mm is provided from the side surface of the table.



■ Do not use the cylinder in places where it is directly exposed to coolant, oil mist, etc.
Be sure to provide a protective cover, etc., if the cylinder must be installed in such a place.

■ Do not use this product where foreign matter such as cutting chips, dust, or spatter, etc., will contact or enter the cylinders.
Provide a protective cover, etc., if the cylinder must be installed in such a place. Be sure to consult with CKD for use in these environments.

■ Prevent negative pressure from occurring inside the cylinder tube. Using the cylinder as an air balancer or operating the table with external force or inertia force with all ports closed may cause negative pressure inside the cylinder, resulting in air leakage if the seal belt comes off. Do not use external force or inertia force, otherwise negative pressure will occur inside the cylinder.

2. Position locking SRM3-Q

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.

■ To operate the cylinder at 500 mm/s and over, reduce the speed when entering the position locking mechanism to 500 mm/s or less.
To reduce the speed, add an external shock absorber or deceleration circuit.

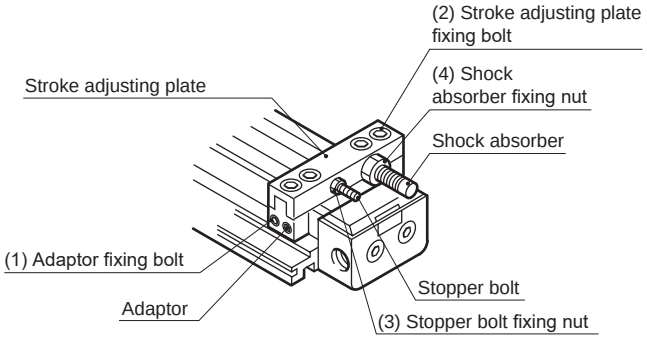
Mounting, installation and adjustment

1. Common

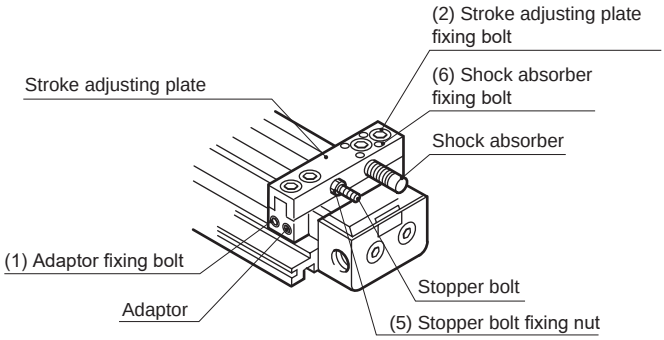
⚠WARNING

■How to adjust the stroke adjusting unit

Full stroke adjustable with standard shock absorber (SRM3-**-***-A1)



Full stroke adjustable with light-load shock absorber (SRM3-**-***-E1)



(1) Moving the stroke adjusting unit

● Loosen the adaptor fixing bolt and the stroke adjusting plate fixing bolt to move the stroke adjusting unit.

(2) Fixing the stroke adjusting unit

● After moving the stroke adjusting unit to the desired position, tighten the adaptor fixing bolt and the stroke adjusting plate fixing bolt with the value in Table 1 to fix the unit.

Table 1 Tightening torque of adaptor fixing bolt and stroke adjusting plate fixing bolt

Tightening torque / Model	Adaptor fixing bolt N·m	Stroke adjusting plate fixing bolt N·m
SRM3-25	6.2 to 7.6	6.2 to 7.6
SRM3-32	6.2 to 7.6	6.2 to 7.6
SRM3-40	10.4 to 12.8	10.4 to 12.8
SRM3-63	19.4 to 23.8	19.4 to 23.8

● To fix the stroke adjusting plate, tighten the fixing bolt with no gap between the adaptor and tube. Then tighten the adaptor fixing bolt.

(3) Adjusting the stroke with a stopper bolt

To adjust the stroke, loosen the stopper bolt fixing nut and turn the stopper bolt. After adjustment, tighten the stopper bolt fixing nut with the value in Table 2 or Table 3 to fix the stopper bolt.

Table 2 Tightening torque of stopper bolt fixing nut and shock absorber fixing nut of model with standard shock absorber (SRM3-**-A, A1 and A2)

Table 3 Tightening torque of stopper bolt fixing nut and shock absorber fixing nut of model with light-load shock absorber (SRM3-**-E, E1 and E2)

Tightening torque / Model	Stopper bolt fixing nut N·m	Shock absorber fixing nut N·m
SRM3-25-A	4.5 to 6	4.6 to 6
SRM3-32-A	9 to 12	7.5 to 10
SRM3-40-A	22 to 30	22 to 30
SRM3-63-A	110 to 143	55 to 70

Tightening torque / Model	Stopper bolt fixing nut N·m	Shock absorber fixing bolt N·m
SRM3-25-E	4.5 to 6	1 to 1.2
SRM3-32-E	4.5 to 6	1 to 1.2
SRM3-40-E	9 to 12	2.3 to 2.8
SRM3-63-E	22 to 30	4.6 to 5.6

(4) Adjusting the shock absorber

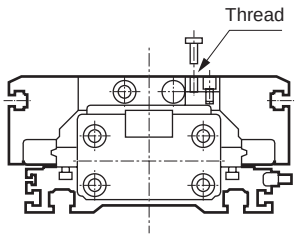
● With standard shock absorber

Change the operational stroke of the shock absorber to adjust its absorbed energy.

To adjust the operational stroke of the shock absorber, loosen the shock absorber fixing nut and turn the shock absorber. After adjustment, tighten the shock absorber fixing nut with the value in Table 2 to fix the shock absorber. Because the gap between the shock absorber and the stopper bolt is narrow, it is recommended to remove the stroke adjusting plate for adjustment.

● With light-load shock absorber

Tighten the shock absorber fixing bolt with the value in Table 3. If tightening too much has deformed the split part, screw a bolt into the thread part in the figure below to loosen the split part.



Model	Thread size
SRM3-25	M3
SRM3-32	M3
SRM3-40	M3
SRM3-63	M3

■Do not perform electric welding after installing the rodless cylinder.

⚠CAUTION

Otherwise electric current passes into the cylinder and causes sparks between the dust-proof belt and cylinder tube, which will damage the dust-proof belt.

■The cylinder body may be damaged or may malfunction if a unit with excessive inertia, etc., is moved. Use within the allowable range.

■Do not apply strong impact or excessive moment to the table.

■Carefully match the centers when connecting a load with an external guide mechanism.

● Displacement of the shaft center increases as the stroke becomes longer. Carefully decide the connection method (floating) so that the displacement can be absorbed.

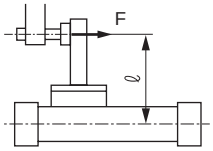
■ Keep moment, including inertia force caused by load transfer or stop, within the allowable load. Damage will occur if this value is exceeded.

(When the overhang load is large)

- When the overhang load is large and the cylinder is stopped at both ends by the piston, load inertia causes bending moment even if the energy is within the allowable absorbed energy of the internal cushion.
  If the kinetic energy is large and an external cushion is used, adjust so that the cylinder contacts with the center of gravity of workpiece or the closest point to it.

(When an external stopper is used)

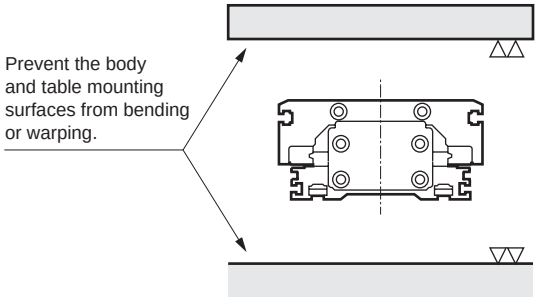
- When using an external stopper, make a selection considering bending moment due to the cylinder thrust.
- Moment that operates when the cylinder stops with an external stopper



$M1 = F \cdot \ell$

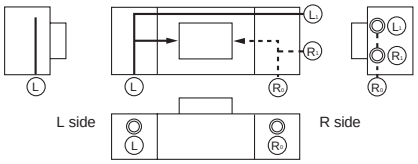
F : Cylinder thrust
ℓ : Length from the center of the cylinder to the stopper

■ Do not damage the surface flatness by denting or scratching the body (tube) mounting surface or the table mounting surface.



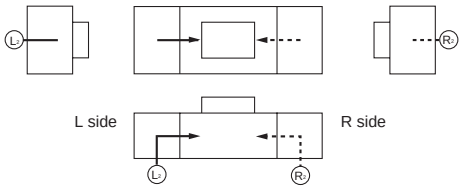
■ Piping port position and operating direction

● Option code (blank, R, B, T)



Ⓡ indicates the pressurized ports on Ⓡside and Ⓛ indicates the pressurized ports on Ⓛ side. When the product is shipped from the factory, ports other than one each of Ⓡand Ⓛ are sealed with plugs. Remove the plugs when piping to the plugged ports. Bottom piping is not possible. If bottom piping is necessary, select the option (D or S). $Ⓛ_1$port is available only for ø25, ø32 and ø40.
$Ⓛ_1$ port is not available for ø63.

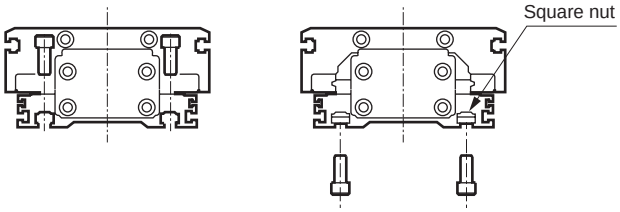
● Option (D, S) (bottom piping)

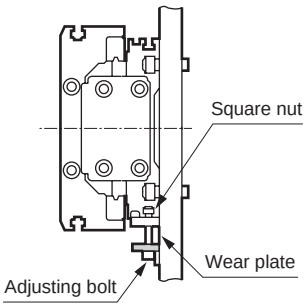


Ⓡindicates the pressurized ports on R side and Ⓛindicates the pressurized ports on L side. There are no ports for piping other than $Ⓡ_2$and $Ⓛ_2$.

■ Main body mounting

SRM3 can be installed in two directions as shown in the figure below. In addition, the T-groove enables flexible installation on the side surface. At that time, allow for level adjustment so that you can complete installation easily.





■ T-groove and square nuts

SRM3 has a T-groove where the square nuts can fit. The square nuts in the table below are supplied with the product as accessories.

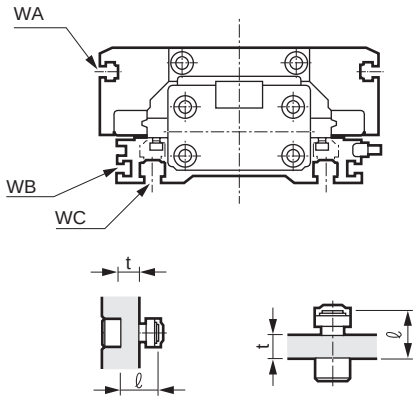
● Accessory square nuts (8 each)

Model	Accessory square nut	
SRM3-25	M4	M5
SRM3-32	M4	M6
SRM3-40	M4	M8
SRM3-63	M5	M10

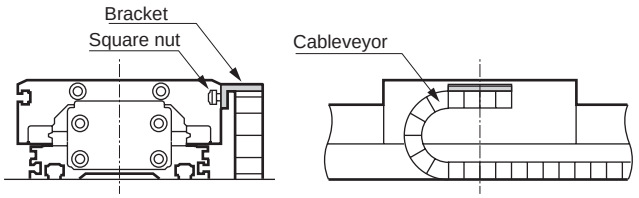
● The following dimensions are recommended for bolt length for T-groove (R).

mm

Model	WA	WB	WC
SRM3-25	M4 ℓ=t+6	-	M5 ℓ=t+6
SRM3-32	M4 ℓ=t+6	-	M6 ℓ=t+8
SRM3-40	M4 ℓ=t+6	M4 ℓ=t+6	M8 ℓ=t+10
SRM3-63	M5 ℓ=t+7	M5 ℓ=t+7	M10 ℓ=t+12



[Applications of table T-groove]

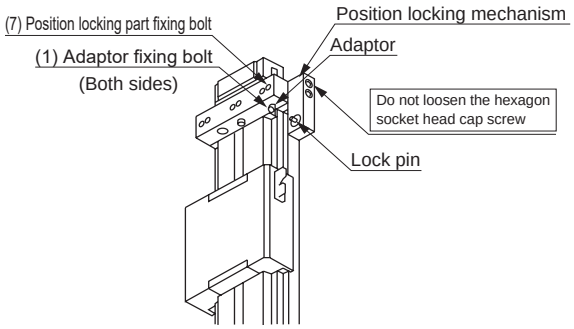


■ CKD's shock absorber is a repair part.
Replace when the energy absorption performance has degraded or the operation is not smooth.

2. Position locking SRM3-Q

⚠ WARNING

■ How to adjust the stroke adjusting unit



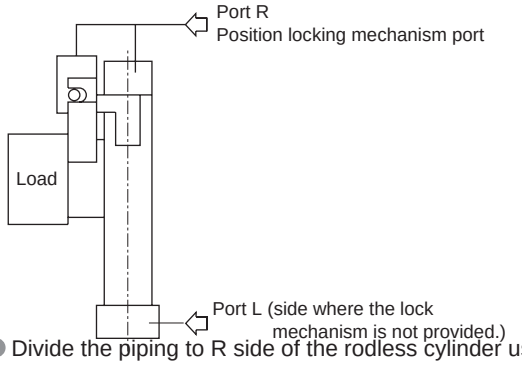
Loosen the (7) position locking part fixing bolt in the figure above to adjust the stroke. Do not loosen the hexagon socket head cap screw on the side in the figure above. Otherwise the position locking part lock pin will be displaced.

- Loosen the adaptor fixing bolt to move the position locking mechanism.
  The type with shock absorber (A, A1, E or E1) should be used in this case. Using the shock absorber to perform fine adjustment of the stroke will displace the position locking mechanism, which prevents secure locking. Therefore, use the adaptor fixing bolt for fine adjustment.
- After moving it to the desired position, tighten the adaptor fixing bolt with the value in the table below. If tightened with a value less than that in the table below, the position locking mechanism may be displaced.
- When setting a load, make sure to check that the lock mechanism functions before installing the product.

■ Piping

Model	(1) Adaptor fixing bolt tightening torque (7) Position locking part fixing bolt tightening torque
SRM3-Q-25	6.2 to 7.6
SRM3-Q-32	6.2 to 7.6
SRM3-Q-40	10.4 to 12.8
SRM3-Q-63	19.4 to 23.8

- Piping to the position locking mechanism is necessary.



- Divide the piping to R side of the rodless cylinder using a tee fitting, etc., and with the same kind of pipe, connect the piping to the position locking mechanism.
- When the piping to the position locking mechanism 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.

■ Supply pressure equal to or higher than the min. working pressure to the position locking mechanism port.

■ Manual release

- Push in the lock pin of position locking mechanism using a stick. At this time, make sure to supply pressure to port L, and before unlocking, check that load is not applied to the lock mechanism.
- If pressure is supplied to port R when both ports R and L are exhausted and the piston is locked, the lock may be unlocked and the table may pop out. This can be extremely hazardous.

■ Valves

- Keeping the cylinder with pressure applied to the lock mechanism may cause the lock pin to come off, which is very dangerous. Do not use 3-position closed center and 3-position P/A/B connection valves.
- If back pressure is applied to the locking mechanism, the lock may be released. Use a discrete valve, or use an individual exhaust manifold.
- 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.

Use/maintenance

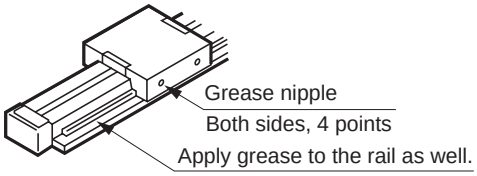
1. Common

⚠ CAUTION

■ The guide of SRM3 Series is already adjusted to the optimum pressure when shipped.
Do not adjust the pressurization unnecessarily.

■ Apply lithium grease to the guide of SRM3 Series when it reaches approximately 100 km of travel distance in normal use (approximately 6 months).
Recommended grease gun
Grease gun unit MG70 (THK)

Nozzle shape P type



2. Position locking SRM3-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, the lock lever contacts the lock pin violently and the lock mechanism may be damaged. 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.

■ 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.

■ 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.

■ Apply grease regularly to the sliding part of the lock lever.