



# 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.

SCP\*3

CMK2

CMA2

Product-specific cautions: Medium bore size cylinder CMK2 Series

SCM

## Design/selection

SCG

### 1. Fine speed CMK2-F

SCA2

#### CAUTION

SCS2

■ Use without lubrication.

CKV2

- Applying lubrication may cause changes in characteristics.

CAV2/  
COVPIN2

■ Assemble the speed controller near the cylinder.

SSD2

- When installed at a distant place from the cylinder, the adjustment becomes unstable.
- Use the SC-M3/M5, SC3W, SCD-M3/M5 or SC3U Series speed controller.

SSG

SSD

■ In general, the speed is stabler at higher air pressure and lower load factor.

CAT

- Use at a 50% or less load factor.

MDC2

■ Stable speed control is achieved with a meter-out circuit.

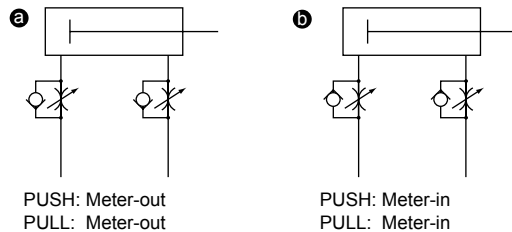
MVC

- When fine speed activation is performed with operating direction PUSH for the single rod cylinder, the popping out phenomenon occurs when operation starts if the load resistance is low. For countermeasures, use the **b**, **c** or **d** circuits. Note that circuit **d** is most stable.

SMG

MSD/  
MSDG

FC\*

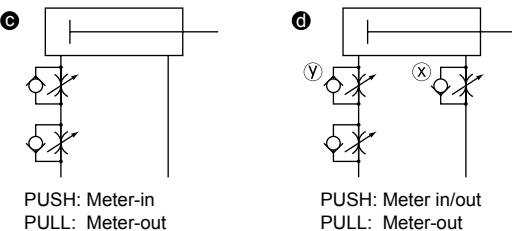


STK

SRL3

SRG3

SRM3



SRT3

MRL2

MRG2

SM-25

ShkAbs

FJ

FK

Spd  
Contr

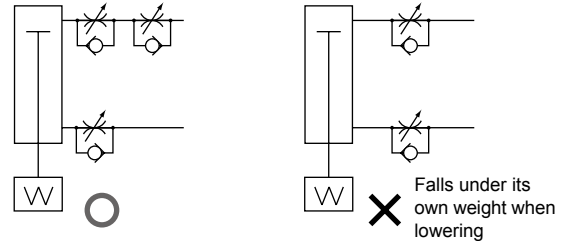
Ending

Speed adjustment method for PUSH operation of **d** circuit:

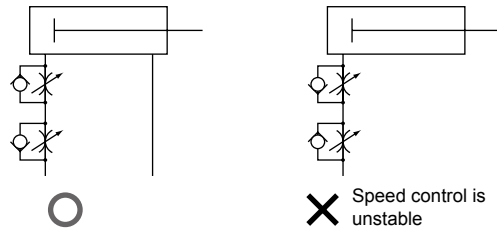
1. Set the speed with the speed controller x.
2. Restrict the speed with the speed controller y until there is no popping out.
3. Check the speed again.

(\*1) When comparing **b**, **c** and **d**, the **d** circuit is the most stable.

(\*2) For vertical mounting, combine the cylinder with a meter-out circuit, as it will fall under its own weight when a meter-in circuit is used.



(\*3) Use the circuit shown in the figure below for the serial connection of the speed controllers.



### (Guidelines for pop-out generation)

Popping out occurs in the following cases.

· Thrust > Resistance

\* Resistance: Thrust caused by residual pressure on the exhaust side (in the fine speed, suction pressure = residual pressure) + { When using horizontally: frictional force caused by load  
When using vertically: load self-weight

■ Do not apply a lateral load to the cylinder.

Also install the sliding guide so that it is not twisted.

- With a lateral load, operation will become unstable.

■ Avoid using this product where vibration is present.

- The product will be adversely affected by vibration and operation will become unstable.

### 2. Coolant proof CMK2-G2/G3

#### CAUTION

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

■ If the piston rod is not exposed to splattered cutting oil or water, use the G or G1 Series.

In the case that the G2 or G3 Series are not exposed to splattering of cutting oil or water, the lubrication of the piston rod will run out and the service life will be shortened.

■ Mount a speed controller on the cylinder.

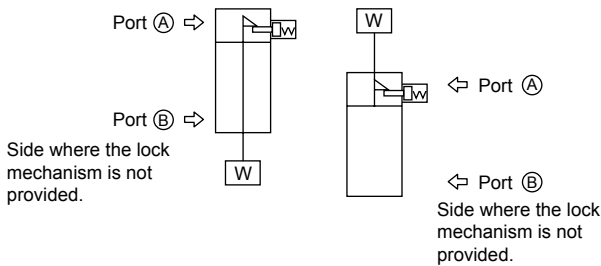
- Mount a speed controller on the cylinder.  
Use each cylinder within the applicable working piston speed range.

SCP*3
<b>CMK2</b>
CMA2
SCM
SCG
SCA2
SCS2
CKV2
CAV2/ COVP/IN2
SSD2
SSG
SSD
CAT
MDC2
MVC
SMG
MSD/ MSDG
FC*
STK
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FJ
FK
Spd Contr
Ending

### 3. Position locking CMK2-Q

#### ⚠ WARNING

- If pressure is supplied to port (A) 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 (B). 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 exhaust valve.

- Do not use 3-position solenoid valves.

Do not use the cylinder in combination with 3-position (especially closed center metal seal) solenoid 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 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.
- Do not use multiple synchronized cylinders. Do not use in such a way that 1 workpiece is moved by synchronizing 2 or more position locking cylinders. Lock release may fail for one of the cylinders.

## Mounting, installation and adjustment

### 1. Common

#### ⚠ CAUTION

- Do not rotate the cover.
  - If the cover is turned when mounting the cylinder or screwing the pipe fitting into the port, damage from the cover connection could occur.

### 2. Single acting CMK2-S/SR

#### ⚠ CAUTION

- Do not leave in a pressurized state. If it is left pressurized for long periods, the piston rod may not return due to spring load when the pressure is released.

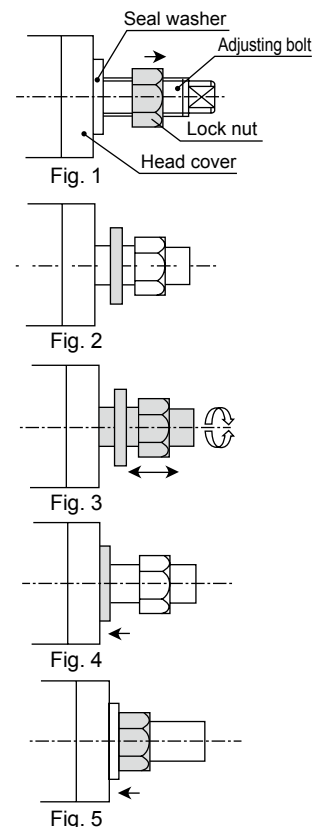
### 3. Stroke adjustable CMK2-P/R

#### ⚠ CAUTION

- Securely lock the adjustable stroke bolt with the lock nut.
- Observe steps (1) to (5) when adjusting the stroke. If adjustments are not made this way, the seal washer will be damaged after one or two adjustments.

#### ■ [Adjustable stroke procedure]

- (1) First loosen the lock nut as shown in Fig. 1.
- (2) Second, remove the seal washer from the head cover by hand, and make a state as shown in Fig. 2.
- (3) Turn the angle adjustment bolt, nut and seal washer together as shown in Fig. 3, and adjust the stroke length. Check that the rubber section of the seal washer does not bite into the thread part.
- (4) After adjusting the stroke, move the seal washer near the head cover by hand as shown in Fig. 4.
- (5) Tighten with the lock nut as shown in Fig. 5. Check that the rubber section of the seal washer does not bite into the thread part.



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Contr

Ending

- After adjusting the stroke, securely tighten the lock nut with the tightening torque in Table 1. Ensure that the lock nut does not loosen and cause external leakage in the course of usage.

Table 1 Tightening torque Unit: Nm

Bore size	CMK2-P (push)	CMK2-R (pull)
φ20	15.8	11.9
φ25	33.4	37
φ32	33.4	37
φ40	55.8	37

- Because a seal washer is used for sealing the stud bolt, the sealing cannot withstand frequent usage.
- If the stroke is adjusted, the cushion cannot function.

#### 4. Heat resistance CMK2-T

##### ⚠ CAUTION

- Magnet is not built in.

#### 5. Rubber-air cushioned CMK2-\*C

##### ⚠ CAUTION

- Note that, structurally, the stroke end position cannot be retained if air supply is cut off. When detecting the stroke end by switch, set the switch position with pneumatic pressure applied, as otherwise the position may be out of the detection range.

#### 6. Position locking CMK2-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 for each model.

- 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 solenoid valve may also cause the same result.

#### 7. Fine speed CMK2-F

##### ⚠ CAUTION

- Perform adjustment such as centering so that a lateral load is not applied to the cylinder. Adjust and install the sliding guide so that it is not twisted.
- When the load or the resistance fluctuates, operation becomes unstable.
- With a large difference between static friction and kinematic friction of the guide, operation becomes unstable.

#### 8. Rotation-stop CMK2-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.

## Use/maintenance

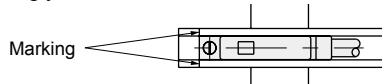
#### 1. Common (with T type switch)

##### ⚠ CAUTION

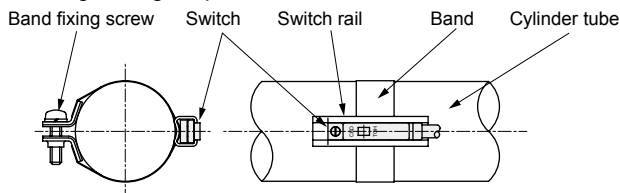
- When moving the switch position to the stroke length direction
  - The 1-color display switch can be fine-tuned by  $\pm 3$  mm from the default. If the adjusting range exceeds  $\pm 3$  mm, or when fine-tuning the 2-color display switch, move the band position.

- Loosen the switch fixing screw, shift the switch along the rail, then tighten at the specified 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 T1, T\*C, T2J, T2Y, T3Y, or T8, 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 moved. Adjust the position accordingly in this case.



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



## 2. Rubber-air cushioned CMK2-\*C

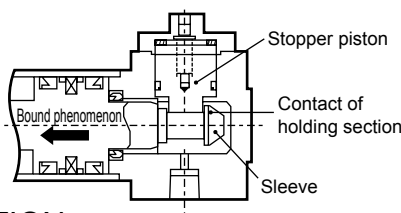
### CAUTION

- Do not rapidly discharge air from the cylinder after performing low speed operation outside the catalog specifications range. (Example: Removing piping or coupler, etc.)  
Otherwise the rubber-air cushion may fall. Especially when the air pressure is high, this becomes more likely. Therefore, be careful.

## 3. Position locking CMK2-Q

### WARNING

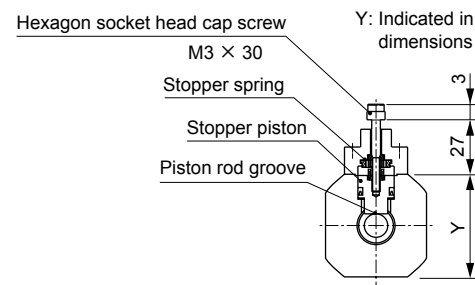
- For safety purposes, prevent the load from falling under its own weight during maintenance.
- When stopping the piston with an external buffer device (shock absorber, etc.), adjust it so that there is no bound.  
If the piston bounds at the stroke end, the sleeve and stopper piston will collide strongly and may result in damage of the locking mechanism.  
Inspect the piston once or twice a year to make sure there is no damage to the retainer caused by this phenomenon.



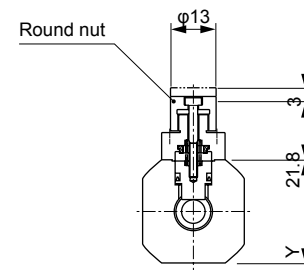
### CAUTION

- Because this cylinder is non-disassembly, do not apply excessive force to the end cover or tube.  
If a back pressure is applied to the lock mechanism side, the lock may be released. Use a discrete solenoid valve for brake release, or use an individual exhaust manifold.

- After the lock mechanism is manually operated, make sure to return the manual override 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 control.  
If the meter-in control is used, the lock may not 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 released.
- Manual override non-locking release method  
By screwing the hexagon socket head cap screw into the stopper piston and pulling the bolt 4 mm with force of 20 N or more, the stopper piston moves and the lock is released. (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, the piston is locked.



- 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 (clockwise) to set it in the locked position causes the stopper piston to return. When it fits into the piston rod groove, the piston is locked.



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Ending