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.

Linear slide cylinder LCR Series

Design & selection

1. Common

⚠CAUTION

■ When selecting the cylinder, follow the "LCR Selection guide" on pages 132 to 135.

■ Protect the cylinder with a cover to prevent damage and malfunction in a place where it is exposed to water or oil drops, or corrosive conditions.

■ Precautions for mounting the switch
- When using the T□V switch with a stroke adjusting stopper (S3**/S4**/S5**/S6**) or shock absorber stopper (A3**/A4**/A5**/A6**), install the switch on the opposite side to the stopper. Otherwise the switch on the head end will contact with the stopper.
- Be careful of the lead wire direction when designing the 30 mm or less stroke since a switch is installed in each groove of the body.

2. Fine speed LCR-F

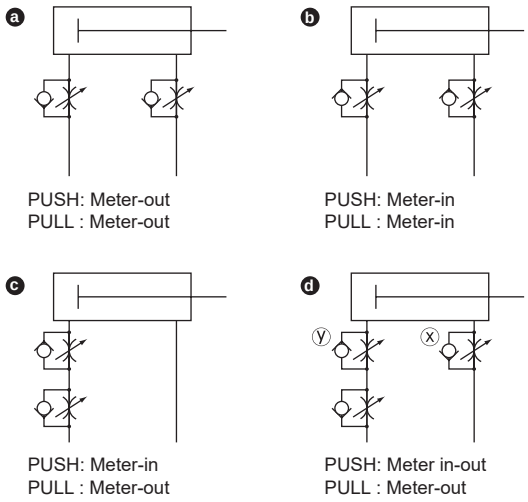
⚠CAUTION

■ Use without lubrication.
Application of lubrication may cause changes in characteristics.

■ Assemble the speed control valve near the cylinder.
When installed at a distant place from the cylinder, the speed becomes unstable.
Use the SC3R-M3/M5, SC3W, SCD-M3/M5 Series speed controllers.

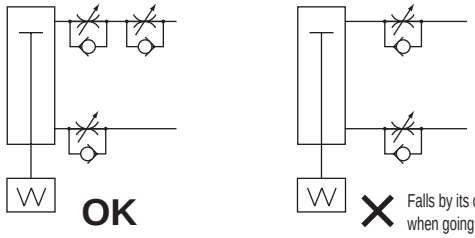
■ In general, the speed is stabler at higher air pressure and lower load factor.
Use at a 50% or less load factor.

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

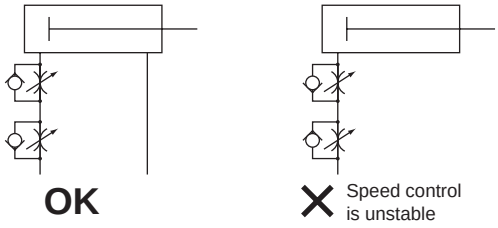


When the fine speed activation is performed while the operating direction is PUSH for the single rod cylinder, the popping out phenomenon occurs at the beginning of the operation in case the load resistance is small. For this countermeasures, use the b, c or d.
Note that circuit d is most stable.
Speed 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.

(Note 1) When comparing b c d, operation is the most stable with d circuit.
(Note 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.



(Note 3) Use the circuit as 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, supply pressure = residual pressure)** + **When using horizontally: frictional force caused by load When using vertically: load self-weight**

Design & selection

■ Do not apply a lateral load to the cylinder.
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.

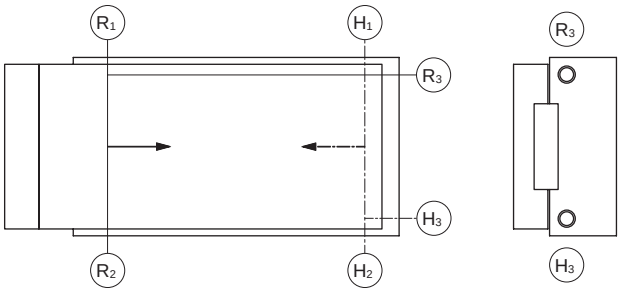
Mounting Installation & adjustment

1. Common; when piping

⚠CAUTION

■ Apply adhesive to the M3 and M5 plugs (hexagon socket set screws) when changing the piping port position. (Low strength adhesives such as LOCTITE 222/221 or ThreeBond 1344 are recommended)

■ Piping port position and operating direction



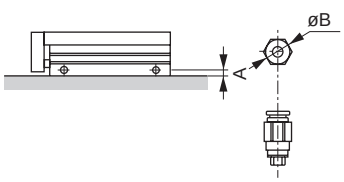
Ⓡ indicates the pressurized ports on the rod side and Ⓗ indicates the pressurized ports on the head side. When the product is shipped from the factory, ports other than Ⓡ1 and Ⓗ1 (Ⓡ2 and Ⓗ2 depending on the stopper position when a stopper is attached) are sealed with plugs.

■ Rear piping
Rear piping (ports Ⓡ3 and Ⓗ3 in the figure above) is possible except in the case of ø6 and position locking.
Remove the plugs sealing ports Ⓡ3 and Ⓗ3 and seal ports Ⓡ1 and Ⓗ1 with the plugs shown in the table below.

Descriptions	Plug
LCR-6	Ⓡ3, Ⓗ3 ports not available.
LCR-8	M5 × 5 (hexagon socket set screw)
LCR-12	
LCR-16	
LCR-20	R1/8 (hexagon socket head tapered screw plug)
LCR-25	Seal the Ⓡ3 and Ⓗ3 ports with the plugs removed from the Ⓡ3 and Ⓗ3 ports.

Prepare two separate plugs shown in the table above for ø8 to 20. Option with plug (refer to page 112) or discrete plug model No. (refer to page 68) are also available.

■ Precautions for piping fittings
Be sure to attach a speed controller during piping before use. The available fittings are as below.



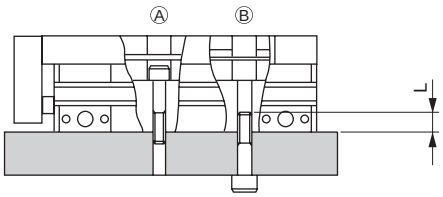
Descriptions / Bore size (mm)	Port diameter	Port location dimensions A	Applicable fitting	Fitting O.D. B
ø6	M3	4	SC3W-M3-4-P7* SC3W-M3-3.2-P7* GWS3-M3-S-P7* GWS4-M3-S-P7*	ø8 or less
ø8	M5	5.5	SC3W-M5-4-P7* SC3W-M5-6-P7* GWS4-M5-S-P7* GWS4-M5-P7*	ø11 or less
ø12		5.5		
ø16		6.5	SC3W-M5-4-P7* SC3W-M5-6-P7* GWS4-M5-S-P7* GWS4-M5-P7* GWL4-M5-P7* GWL6-M5-P7* GWS6-M5-P7*	ø13 or less
ø20	Rc1/8	8	SC3W-6-4, 6, 8-P7* GWS4-6-P7* GWS8-6-P7* GWL6-6-P7*	ø15 or less
ø25		9	GWS6-6-P7* GWL4-6-P7*	

2. Common; when installing

⚠CAUTION

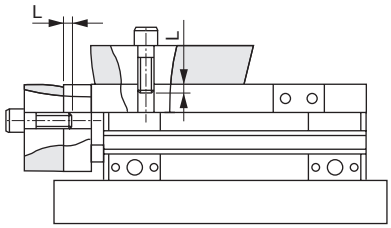
■ Do not damage the surface flatness by denting or scratching the body (tube) mounting surface or the table surface.
In addition, make sure that the flatness of the mating surface for body and table mounting is 0.02 mm or less.

■ Observe the following bolt insertion lengths and tightening torque when mounting the body.
[Fig. 1]



Descriptions	Ⓐ		Ⓑ		
	Applicable bolts	Tightening torque (N·m)	Applicable bolts	Tightening torque (N·m)	Max. insertion length L (mm)
LCR-6	M3 × 0.5	0.6 to 1.1	M4 × 0.7	1.4 to 2.4	6
LCR-8	M3 × 0.5	0.6 to 1.1	M4 × 0.7	1.4 to 2.4	6
LCR-12	M4 × 0.7	1.4 to 2.4	M5 × 0.8	2.9 to 5.1	8
LCR-16	M5 × 0.8	2.9 to 5.1	M6 × 1.0	4.8 to 8.6	9
LCR-20	M5 × 0.8	2.9 to 5.1	M6 × 1.0	4.8 to 8.6	9
LCR-25	M6 × 1.0	4.8 to 8.6	M8 × 1.25	12.0 to 21.6	12

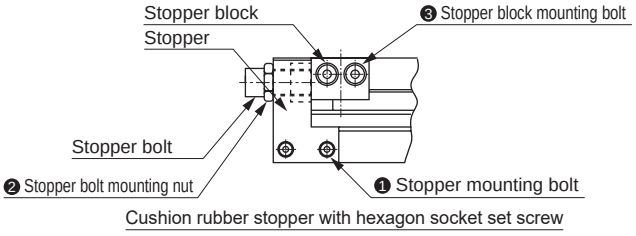
■ Observe the following bolt insertion lengths and tightening torque when installing the jig on the slide table or end plate.
[Fig. 2]



Descriptions	Table		
	Applicable bolts	Tightening torque (N·m)	Insertion length L (mm)
LCR-6	M3 × 0.5	0.6	3
LCR-8	M3 × 0.5	0.6	3 to 4.5
LCR-12	M4 × 0.7	1.4	4 to 5.5
LCR-16	M5 × 0.8	2.9	5 to 6
LCR-20	M5 × 0.8	2.9	5 to 6
LCR-25	M6 × 1.0	4.8	6 to 7

Descriptions	End plate		
	Applicable bolts	Tightening torque (N·m)	Insertion length L (mm)
LCR-6	M3 × 0.5	0.6	4.5 to 6
LCR-8	M3 × 0.5	0.6	4.5 to 7
LCR-12	M4 × 0.7	1.4	6 to 9
LCR-16	M5 × 0.8	2.9	7.5 to 9
LCR-20	M5 × 0.8	2.9	7.5 to 11
LCR-25	M6 × 1.0	4.8	9 to 11

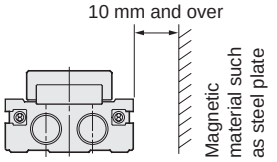
■ Observe the following tightening torque of bolts and nuts of the stopper.
[Fig. A]



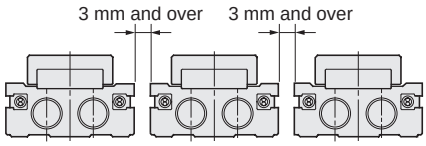
Model No.	❶ Stopper mounting bolt (N·m)	❷ Stopper bolt mounting nut (N·m)	❸ Stopper block mounting bolt (N·m)
LCR-6	0.4 to 0.5	1.2 to 2.0	0.6 to 0.8
LCR-8	0.4 to 0.5	1.2 to 2.0	0.6 to 0.8
LCR-12	0.6 to 0.8	1.2 to 2.0	0.6 to 0.8
LCR-16	0.6 to 0.8	3.0 to 4.0	1.4 to 1.8
LCR-20	2.9 to 3.5	4.5 to 6.0	1.4 to 1.8
LCR-25	2.9 to 3.5	4.5 to 6.0	2.9 to 3.5

■ When you attach/detach a workpiece onto the slide table or the end plate, be sure to support the slide table itself.

■ The cylinder switch may malfunction if there is a magnetic substance such as a metal plate installed adjacently. To ensure safe operation, keep it 10 mm and over away from the cylinder surface or change the installation surface of the cylinder switch. (Common for all port sizes)



■ The cylinder switches may accidentally function if the cylinders are close to each other. Keep the distance below between the surfaces of the cylinders. (Common for all port sizes)



■ When using a positioning hole, use a pin of the dimensions which does not require press fitting. If a pin is press fitted, the stress of press fitting may damage or distort the linear guide, lowering the accuracy.
The recommended tolerance of a pin is JIS tolerance m6 or less.