

Combined functions

LCM

Linear slide cylinder

ø4.5/ø6/ø8



CONTENTS

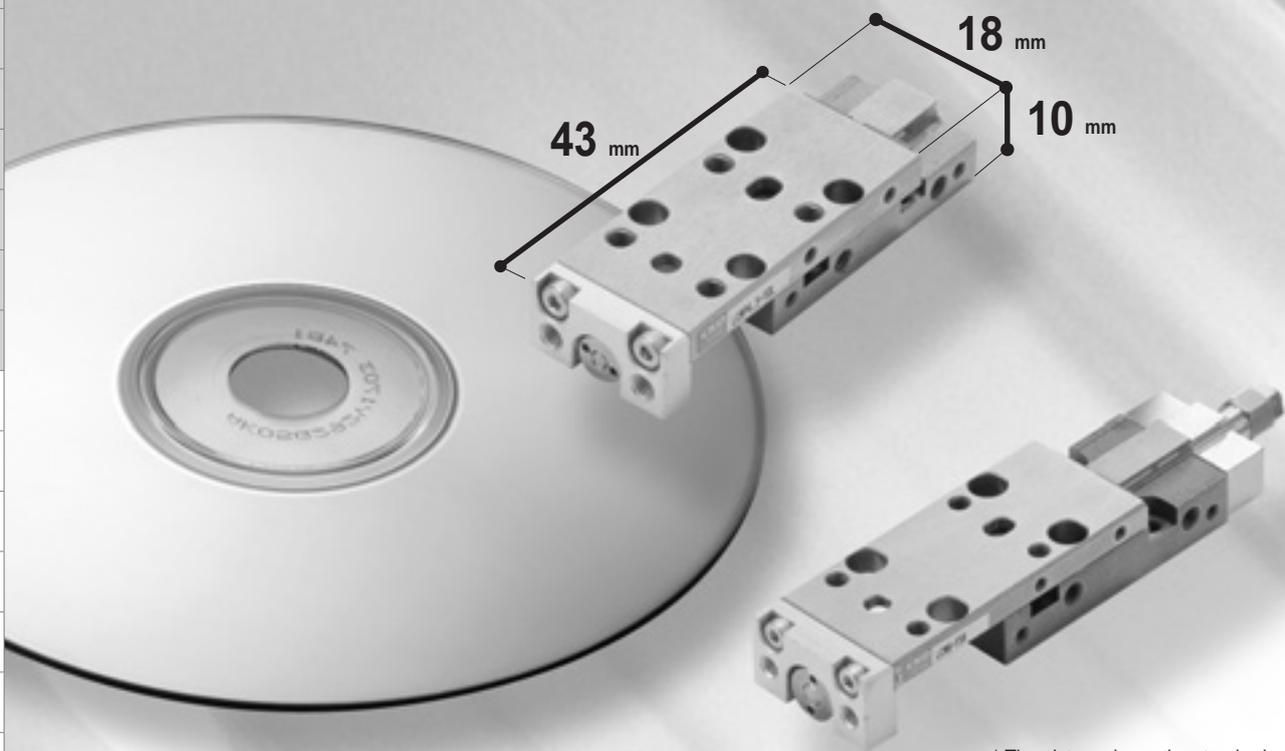
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SCPD3
SCM
SSD2
MDC2
SMG
LCM
LCR
LCG
LCX
STM
STG
STR2
MRL2
GRC
Cylinder Switch
MN3E MN4E
4GA/B
M4GA/B
MN4GA/B
F.R. (module unit)
Clean F.R
Precision R
Press gauge Diff. press gauge
Electro-pneumatic R
Speed controller
Auxiliary valve
Fitting/tube
Clean air unit
Pressure sensor
Flow rate sensor
Valve for air blow
Ending

Compact, high-precision actuator

- SCPD3
- SCM
- SSD2
- MDC2
- SMG
- LCM**
- LCR
- LCG
- LCX
- STM
- STG
- STR2
- MRL2
- GRC
- Cylinder switch
- MN3E
MN4E
- 4GA/B
- M4GA/B
- MN4GA/B
- F.R (module unit)
- Clean F.R
- Precision R
- Press gauge
Diff. press gauge
- Electro-pneumatic R
- Speed controller
- Auxiliary valve
- Fitting/tube
- Clean air unit
- Pressure sensor
- Flow rate sensor
- Valve for air blow
- Ending

Ultra-compact, high-precision, rigid
Linear slide cylinder LCM Series
($\varnothing 4.5/\varnothing 6/\varnothing 8$)



* The picture shows the standard product.

● High-precision positioning

0.005 mm* parallelism during movement and 0.03 mm parallelism of installation is suitable for high-precision positioning.

* 0.006 mm in some models. Refer to page 102 for details.

Parallelism during movement

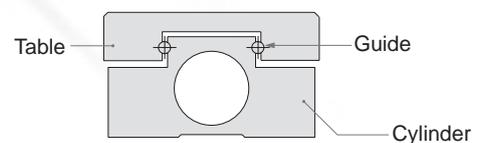
0.005mm

0.03mm

Parallelism of installation

● Ultracompact body

The cylinder body, linear guide and slide table are all integrated into an extremely small body.



Linear Slide Cylinder

LCM Series

● Fits in small, tight spaces

The compact body can fit in a narrow, small space allowing for more flexible layout.

● A workpiece can be mounted on two sides

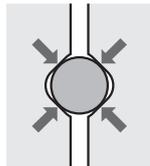
A workpiece can be directly mounted on the top and side with the preprocessed mounting holes.

● Reliable stainless steel body

The cylinder body and slide table are corrosion-resistant stainless steel.

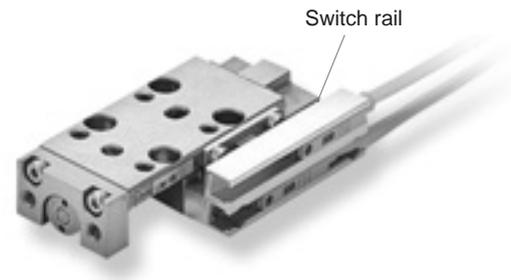
● Resistant to load

Uses linear guide with contact at four points. Withstands load from all directions.



● Compatible with 2-color display switch

The 2-color display switch newly added to the ultracompact F switches is available.

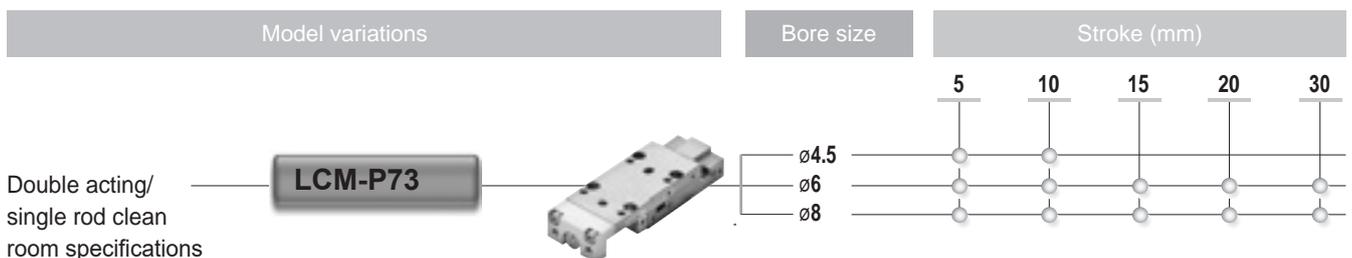


● RoHS Directive compliant

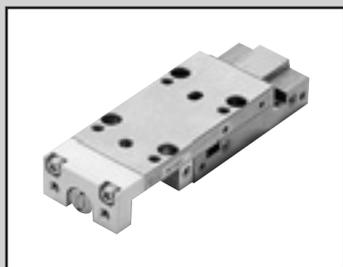
Free from environmentally harmful substances such as lead and hexavalent chromium.

RoHS

■ LCM Series variation



SCPD3
SCM
SSD2
MDC2
SMG
LCM
LCR
LCG
LCX
STM
STG
STR2
MRL2
GRC
Cylinder Switch
MN3E MN4E
4GA/B
M4GA/B
MN4GA/B
F.R. (module unit)
Clean F.R
Precision R
Press gauge Diff. press gauge
Electro-pneumatic R
Speed controller
Auxiliary valve
Fitting/tube
Clean air unit
Pressure sensor
Flow rate sensor
Valve for air blow
Ending



Linear slide cylinder Double acting/single rod Clean room specifications

LCM Series

● Bore size: $\varnothing 4.5/\varnothing 6/\varnothing 8$

JIS symbol



Structure and material restriction

	Structure	Model No.
LCM	P7 Series Vacuum treatment	P73

Specifications

Descriptions	LCM -P73		
	$\varnothing 4.5$	$\varnothing 6$	$\varnothing 8$
Bore size mm	$\varnothing 4.5$	$\varnothing 6$	$\varnothing 8$
Actuation	Double acting		
Working fluid	Compressed air		
Max. working pressure MPa	0.7		
Min. working pressure MPa	0.2		0.15
Proof pressure MPa	1.05		
Ambient temperature °C	0 to 60		
Port size	M3		
Stroke tolerance mm	+1.0 0		
Working piston speed mm/s	30 to 300		
Cushion	None	With rubber cushion	
Lubrication	Not available		
Allowable energy absorption J	Refer to the table on page 103.		

Stroke length

Bore size (mm)	Standard stroke (mm)	Min. stroke with switch (mm)
$\varnothing 4.5$	5/10	5
$\varnothing 6$	5/10/15/20/30	
$\varnothing 8$	5/10/15/20/30	

*1: Other than standard stroke length is not available.

Switch specifications

Descriptions	Proximity 2-wire	Proximity 3-wire	Proximity 2-wire		Proximity 3-wire		
	F2S	F3S	F2H/F2V	F2YH/F2YV	F3H/F3V	F3PH/F3PV (custom order)	F3YH/F3YV
Applications	Programmable controller	Programmable controller, relay	Programmable controller		Programmable controller, relay		
Output method	-	NPN output	-		NPN output	PNP output	NPN output
Power supply voltage	-	10 to 28 VDC	-		10 to 28 VDC	4.5 to 28 VDC	10 to 28 VDC
Load voltage	10 to 30 VDC	30 VDC or less	10 to 30 VDC	24 VDC $\pm 10\%$	30 VDC or less		
Load current	5 to 20 mA	50 mA or less	5 to 20 mA (*2)		100 mA or less	50 mA or less	
Indicator lamp	Red LED (Lit when ON)		LED (Lit when ON)	Red/green LED (Lit when ON)	LED (Lit when ON)	Yellow LED (Lit when ON)	Red/green LED (Lit when ON)
Leakage current	1 mA or less	10 μ A or less	1 mA or less		10 μ A or less		
Weight g	1 m: 10 3 m: 29						

*1: Refer to page 309 for detailed switch specifications and dimensions.

*2: Max. load current: 20mA at 25°C. The current is lower than 25 mA if the operating ambient temperature around the switch is higher than 20°C. (60 to 5 mA at 10°C)

*3: The F type switch uses a bend-resistant lead wire.

Cylinder weight

Unit: g

Stroke length (mm)	5		10		15		20		30		Additional weight
	Without magnet + switch rail	With magnet + switch rail	Without magnet + switch rail	With magnet + switch rail	Without magnet + switch rail	With magnet + switch rail	Without magnet + switch rail	With magnet + switch rail	Without magnet + switch rail	With magnet + switch rail	Weight per switch
ø4.5	45	49	45	49	-	-	-	-	-	-	Refer to weight information provided in the switch specifications.
ø6	61	66	61	66	69	75	77	83	93	100	
ø8	87	92	87	92	108	114	108	114	129	136	

Theoretical thrust table

Unit: N

Bore size (mm)	Operating direction	Working pressure MPa					
		0.2	0.3	0.4	0.5	0.6	0.7
ø4.5	Push	3.2	4.8	6.4	8.0	9.5	11.1
	Pull	2.6	3.8	5.1	6.4	7.7	8.9
ø6	Push	5.7	8.5	11.3	14.1	17.0	19.8
	Pull	4.2	6.4	8.5	10.6	12.7	14.8
ø8	Push	10.1	15.1	20.1	25.1	30.2	35.2
	Pull	8.6	13.0	17.3	21.6	25.9	30.2

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Auxiliary valve
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Pressure sensor
Flow rate sensor
Valve for air blow
Ending

How to order

● Without switch (No magnet for switch)

LCM - 6 - 10 - R ————— **J2 P73**

● With switch (Magnet for switch incorporated)

LCM - 6 - 10 - R - F2H - R - J2 P73

A Bore size

B Stroke length

C Piping direction

D Switch model No.

E Switch quantity

F Option

G Clean room specifications

Code	Content
A Bore size (mm)	
4.5	ø4.5
6	ø6
8	ø8

		Bore size		
		ø4.5	ø6	ø8
B	Stroke length (mm)			
5	5	●	●	●
10	10	●	●	●
15	15	-	●	●
20	20	-	●	●
30	30	-	●	●

C Piping direction	
R	Right from rod end
L	Left from rod end

D Switch model No.						
Lead wire straight	Lead wire L-shaped	Contact	Voltage		Display	Lead wire
			AC	DC		
—	F2S*	Proximity		●	1-color display	2 wires
F2H*	F2V*			●		
—	F3S*			●	1-color display (PNP output) (custom order)	3 wires
F3H*	F3V*			●		
F3PH*	F3PV*			●	2-color display	2 wires
F2YH*	F2YV*			●		
F3YH*	F3YV*		●	display	3 wires	

* Lead wire length	
Blank	1 m (standard)
3	3 m (option)

E Switch quantity	
R	1 (on rod end)
H	1 (on head end)
D	2

F Option		
M	*1	With magnet
F1	*1, 2	With magnet + switch rail (one switch groove)
F2	*1	With magnet + switch rail (two switch grooves)
J*		With positioning pin (*... the number of pins)

G Clean room specifications	
P73	Vacuum treatment

⚠ Precautions for model No. selection

*1: Can be omitted if the switch model No. is specified.

*2: Available only for ø4.5.

[Example of model No.]

LCM-6-10-R-F2H-R-J2P73

Model No.: Linear slide cylinder, double acting

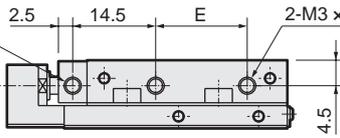
- A** Bore size : ø6 mm
- B** Stroke length : 10 mm
- C** Piping direction : Right when viewed from rod end
- D** Switch model No. : Proximity F2H switch, lead wire 1 m
- E** Switch quantity : 1 (on rod end)
- F** Option : With two positioning pins
- G** Clean room specifications : Vacuum treatment



Dimensions

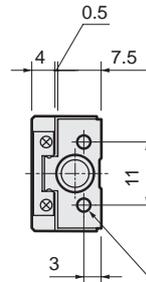
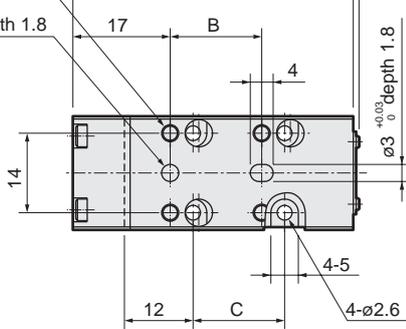
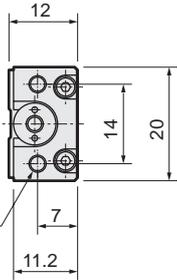
● LCM-6-P73

-L: M3 x 0.5 Dust collection port
 (-R: with plug)

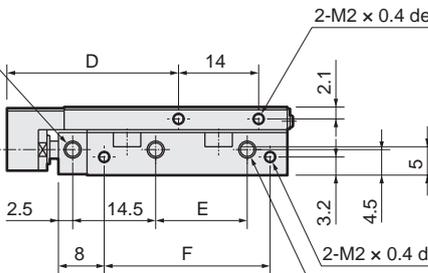


4-M3 x 0.5 depth 4

$\phi 3^{+0.03}_0$ depth 1.8



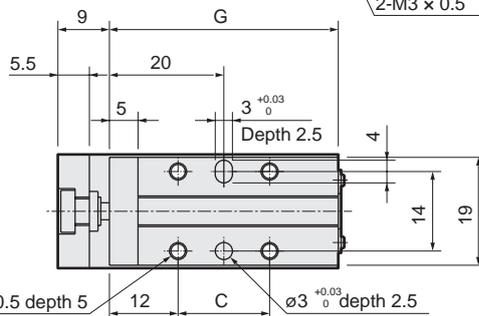
-R: M3 x 0.5 Dust collection port
 (-L: with plug)



2-M2 x 0.4 depth 2.5 (for mounting magnet, both sides)

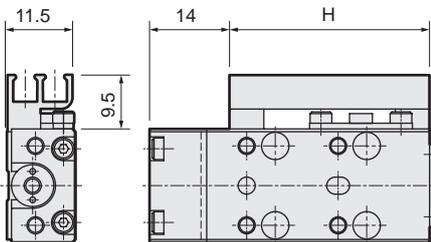
2-M2 x 0.4 depth 3 (for mounting switch rail, both sides)

2-M3 x 0.5 R-side piping port (Note 1)

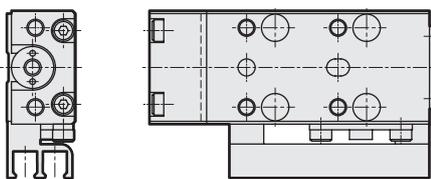


(Note 1) A plug is attached to the opposite side to the piping port specified with the model No.

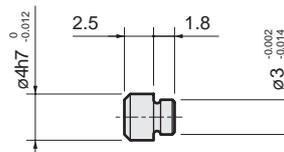
● With magnet/cylinder switch (piping direction: -R)



● With magnet/cylinder switch (piping direction: -L)



● Positioning pin (-J)



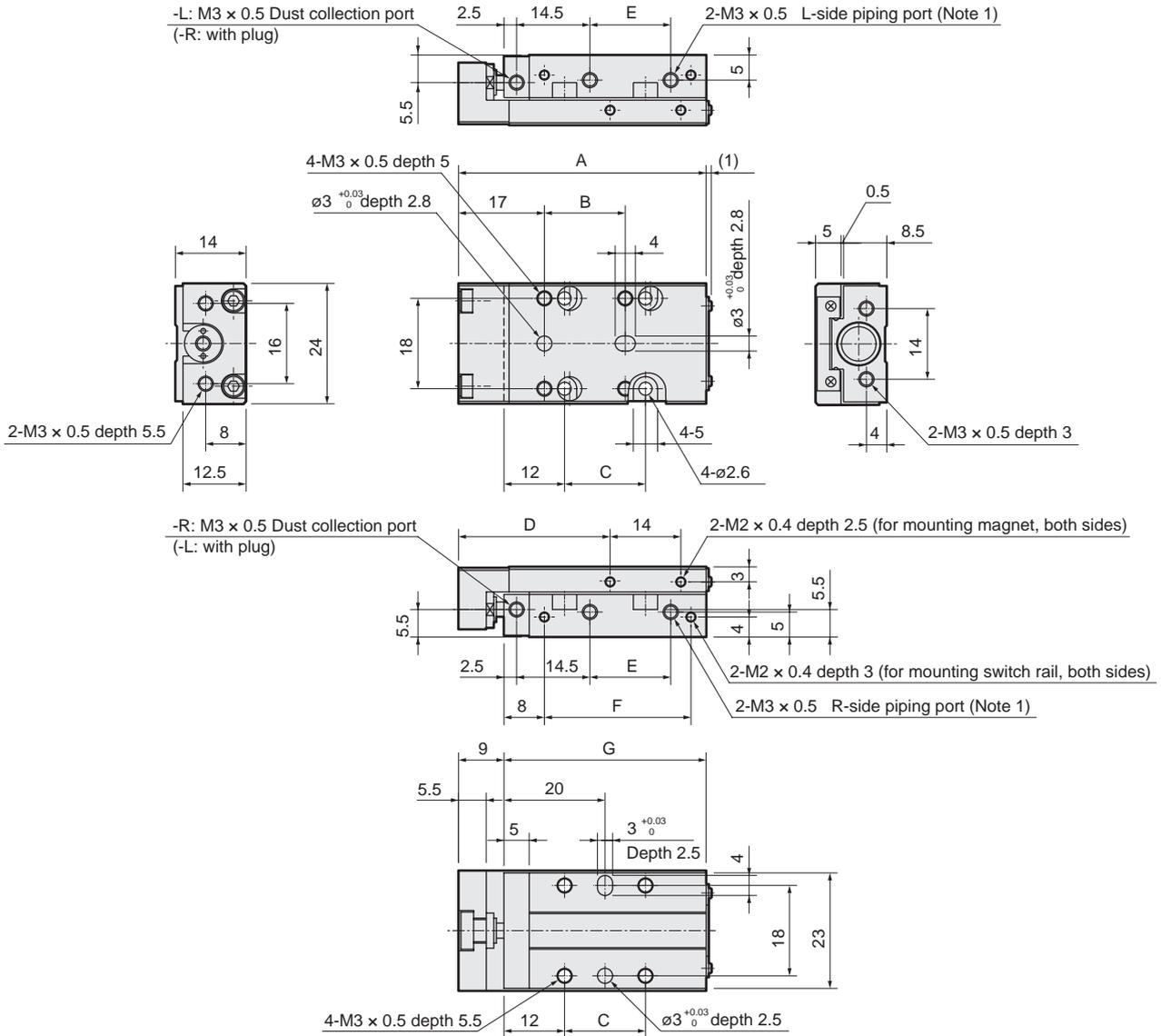
Stroke	A	B	C	D	E	F	G	H
5	49	16	16	30	16	29	40	35
10	49	16	16	30	16	29	40	35
15	54	21	21	35	21	34	45	40
20	59	26	26	40	26	39	50	45
30	69	36	36	50	36	49	60	55

Note: Refer to page 100 for switch mounting position dimensions.

Dimensions

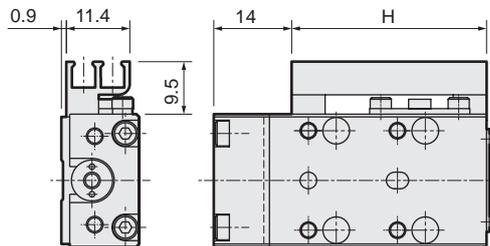


● LCM-8-P73

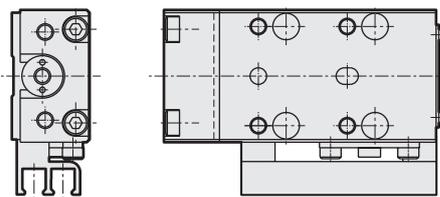


(Note 1) A plug is attached to the opposite side to the piping port specified with the model No.

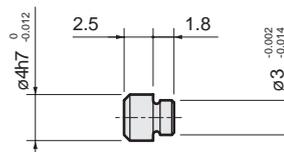
• With magnet/cylinder switch (piping direction: -R)



• With magnet/cylinder switch (piping direction: -L)



• Positioning pin (-J)



Stroke length	A	B	C	D	E	F	G	H
5	49	16	16	30	16	29	40	35
10	49	16	16	30	16	29	40	35
15	59	26	26	40	26	39	50	45
20	59	26	26	40	26	39	50	45
30	69	36	36	50	36	49	60	55

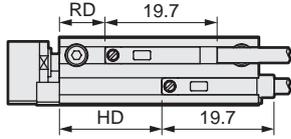
Note: Refer to page 100 for switch mounting position dimensions.

SCPD3
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Clean air unit
Pressure sensor
Flow rate sensor
Valve for air blow
Ending

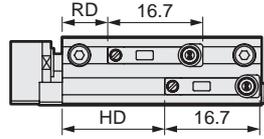
LCM Series Common projection dimensions with switch

● Lead wire hole on the rear side

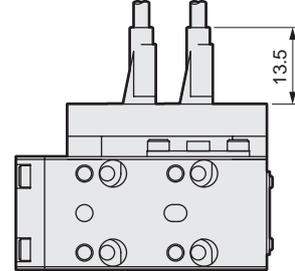
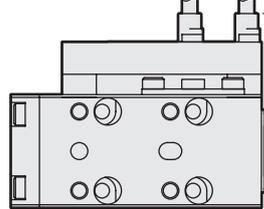
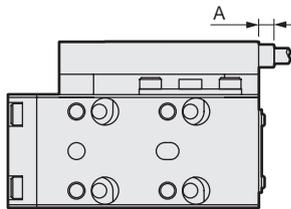
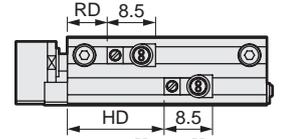
• F*H



• F*V



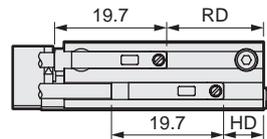
• F*S



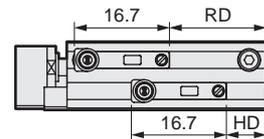
Bore size (mm)	Stroke length	RD			HD			A	
		F*H	F*V	F*S	F*H	F*V	F*S	1-color display	2-color display
ø4.5	5	12	12	11	17	17	2.7	7.2	
	10	7	7	6	17	17			
ø6	5	13	13	12	18	18			
	10	8	8	7	18	18			
	15	8	8	7	23	23			
	20	8	8	7	28	28			
	30	8	8	7	38	38			
ø8	5	13	13	12	18	18			
	10	8	8	7	18	18			
	15	13	13	12	28	28			
	20	8	8	7	28	28			
	30	8	8	7	38	38			

● Lead wire hole on the front side

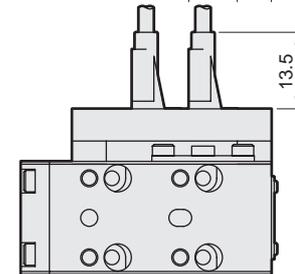
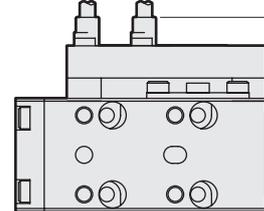
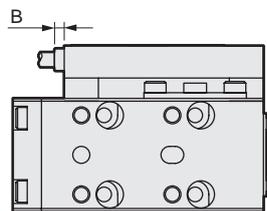
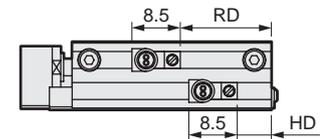
• F*H



• F*V



• F*S



Bore size (mm)	Stroke length	RD			HD			B	
		F*H	F*V	F*S	F*H	F*V	F*S	1-color display	2-color display
ø4.5	5	12	12	11	7	7	6	—	—
	10	17	17	16				1.7	6.2
ø6	5	12	12	11	7	7	6	—	—
	10	17	17	16				1.7	6.2
	15	22	22	21				1.7	6.2
	20	28	27	26				1.7	6.2
	30	37	37	36				1.7	6.2
ø8	5	12	12	11	7	7	6	—	—
	10	17	17	16				1.7	6.2
	15	22	22	21				—	—
	20	27	27	26				1.7	6.2
	30	37	37	36	1.7	6.2			

STEP-1

Confirm that the load moment in the full stroke length is within the allowable value in each direction.

- Direction of moment and length to the center of the guide (X)

Direction	Fig.	Formula
M1 moment		$M1 = L1 \times W$
M2 moment		$M2 = L2 \times W$
M3 moment		$M3 = L3 \times W$

- Allowable moment

Model No.	M1	M2	M3
LCM-*-4.5	0.24	0.22	0.29
LCM-*-6	0.28	0.23	0.34
LCM-*-8	0.28	0.38	0.34

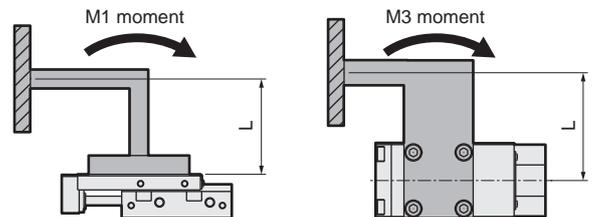
N·m

- Length to the center of the guide

Model No.	Stroke length	X
LCM-*-4.5	5	35
	10	
LCM-*-6	5	36.5
	10	
	15	41.5
	20	
	30	
LCM-*-8	5	36.5
	10	
	15	46.5
	20	
	30	

mm

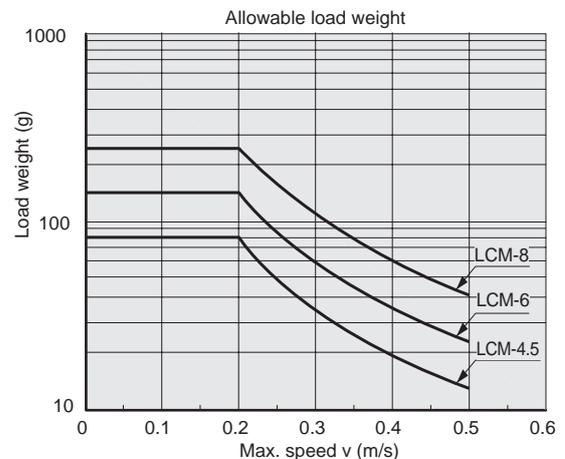
* Note that if a workpiece makes contact at a point off the guide during the stroke, the thrust will cause a large moment.



STEP-2

Confirm that the kinetic energy obtained from the load weight of the cylinder and the piston speed is within the allowable absorbed energy.

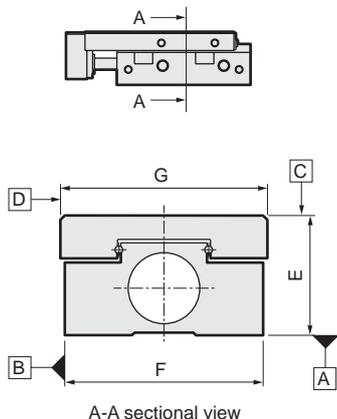
Bore size	ø4.5	ø6	ø8
Allowable energy absorption J	1.59×10^{-3}	2.83×10^{-3}	5.02×10^{-3}



- SCPD3
- SCM
- SSD2
- MDC2
- SMG
- LCM
- LCR
- LCG
- LCX
- STM
- STG
- STR2
- MRL2
- GRC
- Cylinder Switch
- MN3E
MN4E
- 4GA/B
- M4GA/B
- MN4GA/B
- F.R. (module unit)
- Clean F.R
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- Flow rate sensor
- Valve for air blow
- Ending

Technical data

■ Accuracy of the slide table

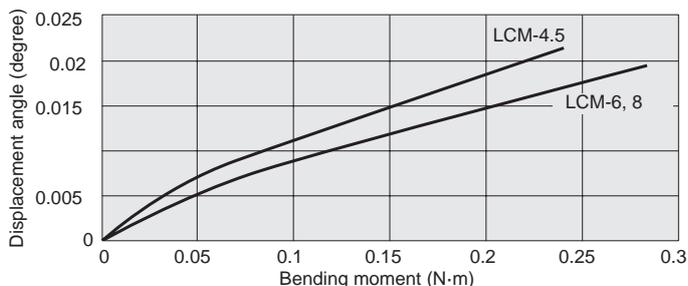
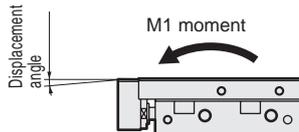


Item		LCM-*-4.5 to 8	mm
Parallelism	C-plane against A-plane	0.03	
	D-plane against B-plane	0.03	
Parallelism during movement	C-plane against A-plane	0.005*	
	D-plane against B-plane	0.005*	
Tolerance of E		±0.05	
Tolerance of F		±0.05	
Tolerance of G		±0.05	

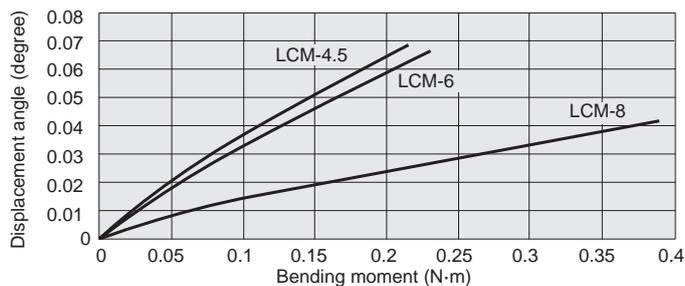
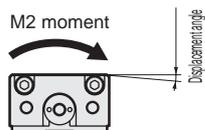
* 0.006 in LCM-6, 8 with 30 mm stroke

■ Displacement angle of the table due to a bending moment (reference value)

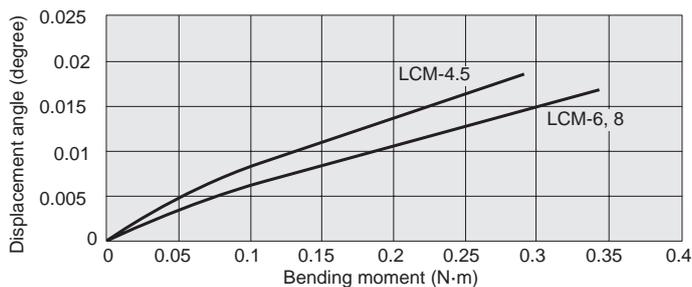
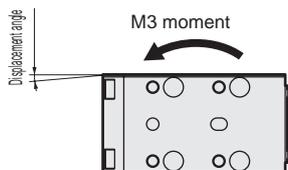
M1 moment



M2 moment



M3 moment





Pneumatic components

Safety Precautions

Be sure to 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 LCM Series

Design & selection

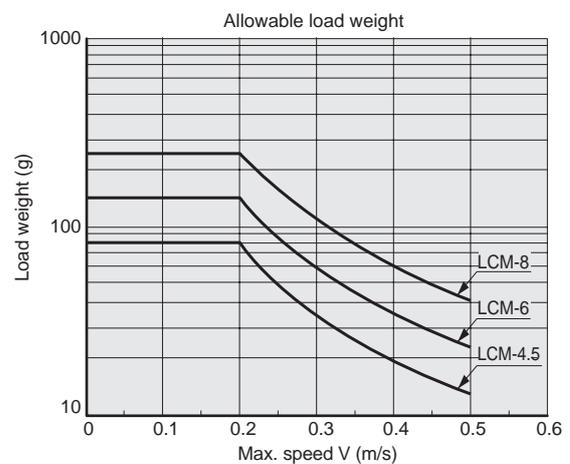
1. Common

CAUTION

- When selecting a cylinder, follow the "LCM selection guide" on page 101.
- 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.
- The stainless steel body and slide table may rust in some environments. Apply an appropriate amount of rust proofing agent oil periodically.
- Switches may accidentally function near a magnetic field. A magnetic substance near the switch may also cause an accidental operation. When setting a magnetic workpiece on the slide table, adjust the size so that it does not get closer to the switch across the table end.
- Putting a strong magnet close to the product may cause magnetization of the product, which may result in an accidental operation of the switch.

- Use the cylinder within the allowable absorbed energy in the table below. If kinetic energy exceeds these values, consider using a separate shock absorber.

Bore size	ø4.5	ø6	ø8
Allowable energy absorption J	1.59×10^{-3}	2.83×10^{-3}	5.02×10^{-3}



Mounting, installation & adjustment

1. Common: when piping

- Apply adhesive to the M3 plug (hexagon socket set screw) when changing the piping port position. (Low strength adhesives such as LOCTITE 222/221 or Three Bond 1344 is recommended) Tighten the plug up to a halfway point so that the screw does not protrude from the port surface and does not reach the bottom of the port.
- As compatible fittings are limited, refer to the table below to select a fitting.

Recommended fittings

Bore size	Recommended fittings
All port sizes	CG-S2-M3
	CG-S2-M3-S
	CG-L2-M3
	FTS4-M3-P80 *2
	FTL4-M3-P80 *2

*1: FTL4-M3 is not available for ø4.5 clean room specifications dust collection port.
*2: Copper-based materials are used. Please refer to page 946 of this catalog.

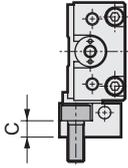
- Do not damage the surface flatness by denting or scratching the body mounting surface or the slide table surface. Make sure that the flatness of the mating surface for mounting is 0.02 mm or less. Poor flatness may result in lower performance of the guide, higher rolling resistance or shorter service life.
- Use a clearance-fit stepped pin (option) for positioning. If a press-fit pin is used, the load of press fitting may damage the guide and result in failure. Also, if the pin is not stepped, it will interfere with the body since the pin hole is through, which may result in failure.
- The slide table and end plate are supported by balls. When fixing a jig with bolts, be sure to hold the slide table and end plate while tightening. Otherwise a large moment will be applied to the guide, resulting in low accuracy of the guide.

- SCPD3
- SCM
- SSD2
- MDC2
- SMG
- LCM**
- LCR
- LCG
- LCX
- STM
- STG
- STR2
- MRL2
- GRC
- Cylinder Switch
- MN3E
- MN4E
- 4GA/B
- M4GA/B
- MN4GA/B
- F.R. (module unit)
- Clean F.R
- Precision R
- Press gauge
- Diff. press gauge
- Electro-pneumatic R
- Speed controller
- Auxiliary valve
- Fitting/tube
- Clean air unit
- Pressure sensor
- Flow rate sensor
- Valve for air blow
- Ending

Mounting, installation and adjustment

■ Observe the following bolt insertion lengths and tightening torque when installing the jig on the body, slide table or end plate.

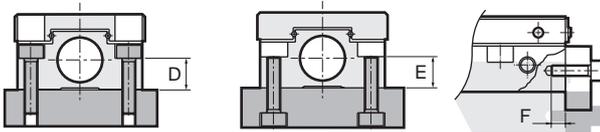
- Installing the body (side installation)



Do not use a washer, etc. Otherwise the mounting bolt contacts the guide, resulting in damage.

Model No.	Applicable bolts	Max. tightening torque N·m	C mm
LCM-A-4.5	M3 × 0.5	1.14	5
LCM-A-6	M3 × 0.5	1.14	5
LCM-A-8	M4 × 0.7	2.7	4

- Mounting body

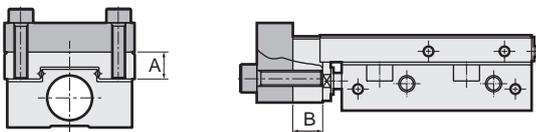


Model No.	Applicable bolts	Max. tightening torque N·m	D mm
LCM-*4.5	M2 × 0.4	0.32	3.5
LCM-*6	M2.5 × 0.45	0.65	5
LCM-*8	M2.5 × 0.45	0.65	5.5

Model No.	Applicable bolts	Max. tightening torque N·m	E mm
LCM-*4.5	M2.5 × 0.45	0.65	3.5
LCM-*6	M3 × 0.5	1.14	5
LCM-*8	M3 × 0.5	1.14	5.5

Model No.	Applicable bolts	Max. tightening torque N·m	Max. screw depth F mm
LCM-*4.5	M2 × 0.4	0.32	2.5
LCM-*6	M2.5 × 0.45	0.65	2.5
LCM-*8	M3 × 0.5	1.14	3

- Attaching a jig



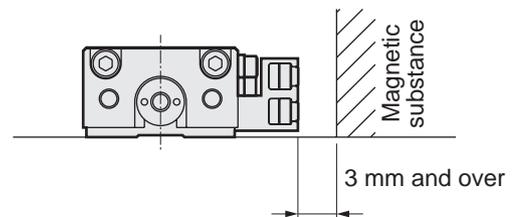
Model No.	Applicable bolts	Max. tightening torque N·m	Max. screw depth A mm	Max. screw depth B mm
LCM-*4.5	M3 × 0.5	0.63	4	4.5
LCM-*6	M3 × 0.5	0.63	4	5.5
LCM-*8	M3 × 0.5	0.63	5	5.5

Note: Keep the length of the bolt for mounting a workpiece within the max. screw depth. Otherwise it may contact and damage the body.

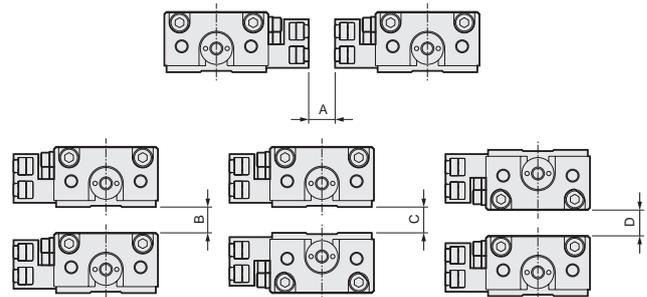
■ This series can be modified to the type with switch. Also, the switch mounting surface can be changed. Observe the following tightening torque of bolts for fixing the switch rail. Note that the port on the switch mounting surface is not used and should be plugged before the switch rail is installed.

Model No.	Applicable bolts	Max. tightening torque N·m
LCM-*4.5	M2 × 0.4	0.17
LCM-*6	M2 × 0.4	0.17
LCM-*8	M2 × 0.4	0.17

■ The cylinder switch may malfunction if there is a magnetic substance such as a metal plate installed adjacently. Confirm that a distance of at least 3 mm is allocated from the surface of the switch rails. (Same for all bore sizes)



■ The cylinder switches may accidentally function if the cylinders are close to each other. Keep A, B, C and D 3 mm and over. (Same clearance for all bore sizes)



During use & maintenance

CAUTION

■ Apply CGL grease (IKO) to the guide rail every six months or three million operations, whichever comes first.