Electric Cylinder LZG series
Operation Manual
SMC Corporation

1. Safety Instruction

These instructions indicate the level of potential hazard by labels of "Warning" and "Caution". To ensure safety, be sure to observe ISO 10218-1992 / JIS B8433-1993 and other safety practices.

⚠ Warning : Operator error could result in **serious injury or loss of life.**

⚠ Caution : Operator error could result in **injury** or equipment **damage.**

Symbols

Symbols	Explanation
Warning	Symbol expresses warning and caution. Contents are instructed by figure or phrase in/by the symbol.
Do not	Expresses "Do nots". Contents are instructed by figure or phrase in/by the symbol.
Do	Expresses "Dos". Contents are instructed by figure or phrase in/by the symbol.

Operator

- This manual is for person in charge of assembly, operation, and maintaining of machinery and device with electric control equipment who has enough knowledge and experience. Other person is not allowed to do this work.
- The manual must be read through before assembly, operation and maintenance.

Application limit

LZG aims at application for common FA equipment. Do not use LZC for machinery and device(1) which directly matter human life or those which malfunction or failure could cause serious damage.

*1:Machinery and device which directly matter human life are;
- Life support system or surgical equipment
- Device obligated by Laws and regulation such as Fire protection law and Building code.
- Equipment and device comply with above.

Contact SMC Sales office if LZG is used for the system relating to human safety and has impact on public function(2). Special consideration(3) is necessary for the management, maintenance and control of the system.

*2:Systems relating to human safety and has impact on public function are;
- Main machine control system of nuclear plant, safety protection system of nuclear installation, and other systems which are improtant for safety
- Drive control system and flight control system of group transportation system
- Equipment and device contact with food and beverage.

*3: Special consideration means to hold an enough conference with SMC engineers, and to construct a safe system (The rule proof design, the fail safe design, and design using redundancy).

- Special consideration for safety and security shall be considered to prevent the risk and damage by failure and malfunction caused by environmental stress(change over time) with certain percentage.

⚠Warning	
Overhaul	- Do not overhaul nor modify parts(incl. circuit board). It might cause injury or failure.
Wet hand	- Do not operate nor set with wet hand. It might cause electric shock.
Do not	- Do not exceed specified operating range. It might cause fire accident, malfunction, and cylinder breakage. Keep operating range.
Do not	- Do not use where containing flammable gas, explosive gas, corrosive gas. They might cause fire, explosion and corrosion. This actuator is not explosion proof structure.
Do not	- Do not connect nor operate with other than applicable motor or cylinder. It might cause fire, explosion and corrosion.
Get caught	- Attention should be taken not to be caught nor contacted by the work while the cylinder operating. It might cause injury.
Do	- To avoid the risk and the damage due to failure and malfunction occurred with certain percentage, establish back-up system such as multple system equipment/device, fail-safe structure in advance.
Do	■For vertical operation, protection against falling shall be prepared. If the power to the motor is cut by power failure etc.,the work may fall by its dead weight.

⚠Caution	
Do not touch	- The side surface of directional control equipment and the cylinder motor becomes hot. Do not touch until they are cooled down.
Connect ground	- Ground with FG terminal Without ground, malfunction might occur which lead to cause accident. For better ground efficiency, keep the ground wiring distance short and special grounding is recommended.
Do	- Perform appropriate function test after maintenance. Stop operation when device and equipment do not work correctly. Unexpected malfunction might risk safety operation. Perform emergency stop and ensure safety.
Do	- Connect the power and turn on the switch after ensuring the safety of the slider's moving range. Moving slider might cause an accident.

Caution on handling

Keep following on designing, selection and operation of this product.

- Design/Selection
(Requirement for mounting, wiring, operating environment, adjustment, operation and maintenance shall be kept.)

Specification

-Keep specified voltage
- Do not exceed max. allowable load.
- Keep maintenance space.

Handling

Mounting
- Do not drop or bump or apply excessive impact
- Keep directional control equipment 50mm or more away from inner surface of control panel or other equipment.
- Do not hold the guide rod when handling.
- Keep specified tightening torque.
- Do not mount cylinder where it can be trod on.
- Cylinder should be mounted on a flat surface with machine accuracy 0.05 or less.
- When mounting cylinder, always use 4 mounting holes.
- Do not exceed the allowable rotational torque when mounting work piece on the plate.

Wiring
- Avoid repeatedly bending or stretching the cable.
- Confirm proper wiring
- Do not wire while power applied.
- Do not wire adjacent to power lines or high voltage lines to avoid noise interference.
- Confirm proper insulation of wiring.

Operating environment
- Avoid use in the following environments.
- Location with a lot of debris, dust, water, chemicals, or oil.
- Locations where magnetic field is generated.
- Location where temperature cycles is applied.
- Location where surge voltages are generated.
- Prepare lightning surge protection on the device.
- Mount where no vibration or impact exists.

Maintenance
- Periodic maintenance is required. See "7. Inspection / Maintenance".

Vertical operation
- Do not apply a force greater than the rated thrust to the plate. Otherwise, the electric cylinder and directional control equipment may be damaged.

2. Part check

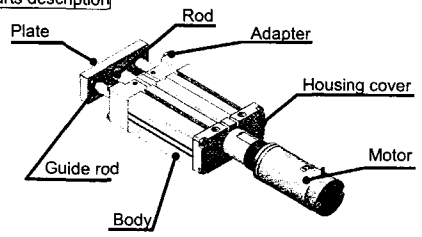
Ensure parts below are included in the package.

Parts	Qty.
Main body	1
Operation Manual (This document)	1

Accessories(Included for LZGLY[][] only)

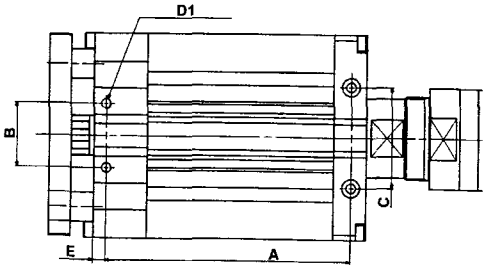
Parts description	Qty.
Rod end mounting foot	1
Hexagon socket set bolt	4
Parallel dowel pin	2

3. Parts description



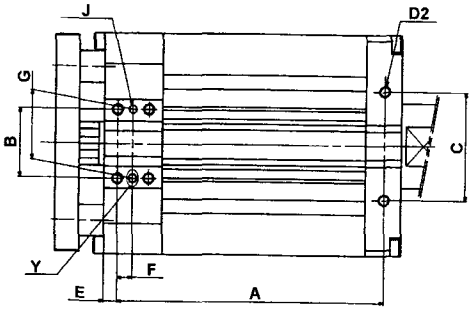
4. Mounting

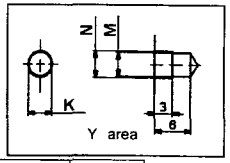
4-1 Hole mounting on top of the body



	A	B	C	D1	E
LZGL3□	Stroke+63	25	35	4-Ø4.6 depth 33	5
LZGL5□	Stroke+85	35	55	4-Ø5.6 depth 52	7

4-2 Thread mounting on the under side



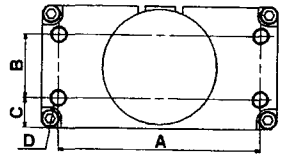


	K	N	M
LZGL3□	3H9	3.5	Ø 3H9
LZGL5□	4H9	4.5	Ø 4H9

	A	B	C	F
LZGL3□	Stroke+63	25	35	7.5
LZGL5□	Stroke+85	35	55	8.0

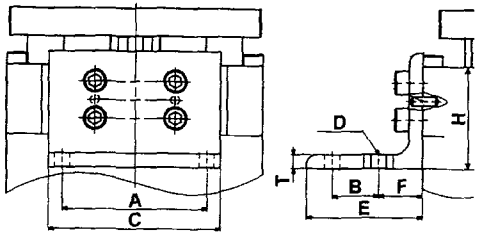
	G	J	D2
LZGL3□	25±0.02	Ø3H9 depth 6	4-M5X0.8 X 10 deep
LZGL5□	35±0.02	Ø4H9 depth 6	4-M6X1.0 X 12 deep

4-3 Thread mounting on the bottom (Mounting to the housing cover)



	A	B	C	D
LZGL3□	70	18	11	4-M5X0.8 X 11 deep
LZGL5□	96	30	14	4-M8X1.25 X 17 deep

4-4 Foot mounting (applicable for LZGLY□□ only)

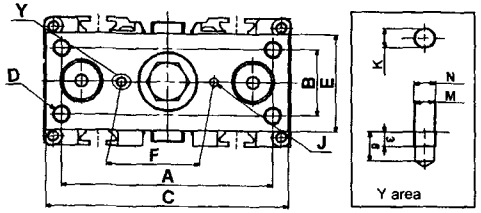


	A	B	C	E
LZGLY3□	44	20	54	50
LZGLY5□	63	20	75	50
	F	T	H	D
LZGLY3□	19	6	41.5	4-Ø5.5
LZGLY5□	19	6	44	4-Ø6.6

* Foot and mounting bolts are included in the package.

	Bolt	Tightening torque[N/m]
LZGLY3□	M5X16	4.4
LZGLY5□	M6X16	6.8

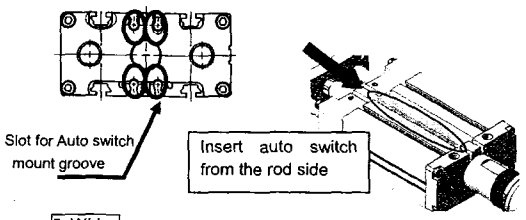
4-5 Mounting to work piece



	A	B	C	E	F
LZGL3□	70	18	81	30	30±0.02
LZGL5□	96	30	110	44	42±0.02
	J			D	
LZGL3□	Ø3H9 depth 6			4-M5X0.8 X 10 deep	
LZGL5□	Ø4H9 depth 6			4-M8X1.25 X 12 deep	
	K	N	M		
LZGL3□	3H9	3.5	Ø 3H9		
LZGL5□	4H9	4.5	Ø 4H9		

4-6 Mounting Auto switch

Auto switch can be mounted to the slots of the body.



5. Wiring

Connect the motor cable to the specified directional control equipment, LC3F2 motor output terminal (CN3).

(See "Directional Control Equipment LC3F2 operation Manual" for details)

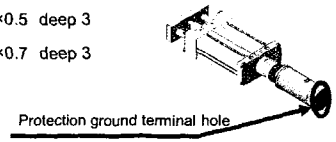
Electric cylinder model no.	Applicable Directional Control Equipment model no.
LZGL3□−□□□A31	LC3F212-5A3□
LZGL5□−□□□A51	LC3F212-5A5□

*Protection ground terminal connection

Ground the system using the protection ground terminal on the motor of electric cylinder.

LZGL3□: M3×0.5 deep 3

LZGL5□: M4×0.7 deep 3



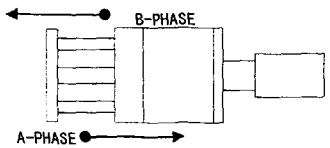
6. Operation

6-1 Trial run / Adjustment

Initiating a signal to the control terminal and the electric cylinder starts.

Cylinder may have sudden movement if operated with max. torque. Set the dial at minimum (counterclockwise), and increase the torque gradually.

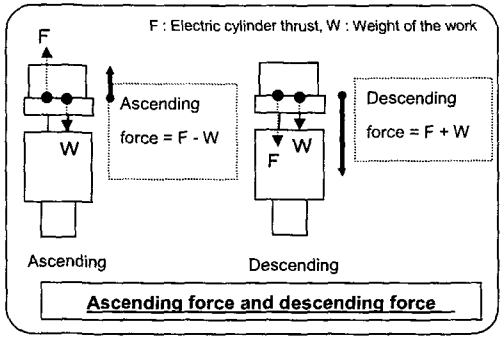
Terminal	A-PHASE direction	B-PHASE direction	Stop signal
ON	ON	ON	OFF
SET	ON	ON	—
A-PHASE	ON	OFF	—



⚠ Warning	
Warning	Do not touch the work during test run and torque adjustment.
Do not	Stop the rod when changing rotation direction to avoid malfunction.

6-2 Vertical operation (Applicable for LZGL□□L only)

In vertical operation, the force including the weight of the work is larger when descending than ascending, and the force of the impact at the lower end of the movement may become to high. Impact to the work piece during descending shall be taken into consideration for design.



⚠ Warning	
Do not	Electric cylinder shall not be operated by load(Weight of work). The regenerated voltage by the DC motor causes malfunction or damages to the directional control equipment.

7. Check / Maintenance

7-1 Daily check

Check followings before/after operation.

Check item	
Appearance	No gouge or nick found on the body. No debris, dust or water adhered.
Motor	If it is too hot.
Cable	No damage, cracked or incorrect wiring.

7-2. Periodic check

Inspection after 6 months or the not use for 1 month or longer.

Check item	
Mounting the body	No loose parts.
Feed screw sliding part	Rod is not obstructed in operation in allowable moving range.

7-3. Life

Reference for energizing time

Motor type	Mount style	Time for power supply
A31	Horizontal /Vertical	3,000hrs(Operation 60%, holding 40%)
A51		4,000hrs(Operation 60%, holding 40%)

Reference of travel depending lead

Model	M	Travel (km)
LZGL3L	Horizontal/Vertical	200
LZGL3M	Horizontal	640
LZGL3H		1,200
LZGL5L	Horizontal/Vertical	280
LZGL5M	Horizontal	850
LZGL5H		1,700

Note: Refer shorter data from above.

Reference above is calculated based on the actual life data. Therefore, the life may be shorter due to the environment or operating conditions.

8. Trouble shooting

Refer to the trouble shooting section of " Operation manual of Directional Control equipment LC3F2" when cylinder (motor) does not start or operation stops suddenly.

9. Specifications

	LZGL□3L-□□□□3□	LZGL□3M-□□□□3□	LZGL□3H-□□□□3□
Mount direction	Horizontal /Vertical	Horizontal	
Feed screw lead (mm)	2	6	12
Rated speed with no load (mm/s)	33	100	200
Rated thrust (N)	80	43	24
Conveyable workload vertically (kg)	3.5		
Stroke range (mm)	1 to 200(Std. stroke : 25/40/50/100/200)		
Applicable directional control equipment	LC3F212-5A3□		
Applicable auto switch	D-M9N/ D-M9P/D-M9P		

9. Specifications (continued)

	LZGL5L -□□□5□	LZGL5M -□□□5□	LZGL5H -□□□5□
Mount direction	Horizontal /Vertical	Horizontal	
Feed screw lead (mm)	2	6	12
Rated speed with no load (mm/s)	33	100	200
Rated thrust (N)	196	117	72
Conveyable workload vertically (kg)	9		
Stroke range (mm)	1 to 200 (Std. stroke : 25/40/50/100/200)		
Applicable directional control equipment	LC3F212-5A5□		
Applicable auto switch	D-M9N/ D-M9P/ D-M9B		

Note Select the thrust for vertical mounting considering the guide dead load.

(N)

Stroke(mm)	25	40	50	100	200
LZGL3□	1.6	2.0	2.1	2.7	3.9
LZGL5□	4.5	4.9	5.2	7.3	10.4

10. How to Order

L Z G L Y 3 L - 1 0 0 A 3 1 - M 9 B 1

Bearing type
- L: Ball bush bearing

Mounting
- Y: Rod side foot

Body size
- 3: Relevant to ϕ16 cylinder (Note)
- 5: Relevant to ϕ25 cylinder (Note)

Note) Relevant to 0.4MPa theoretical output(at Lead 2).

Lead screw type(mm)
- L: 2mm
- M: 6mm
- H: 12mm

Standard stroke
25, 40, 50, 100, 200
- Stroke other than these are made to order. (Max. possible stroke is 200mm. Available by 1mm or increment)
- When specifying by 1mm of increment, outer stroke is changed by the same increment.

Motorspecification
- See table below for applicable motor

Autoswitch
- Nil: No autoswitch
- See table below for autoswitch part no.
- Autoswitch is included in the package

Autoswitch suffix
- Nil: 2pcs.
- s: 1pcs
- n: n pcs.

● Motor specification

- For LZG**3*

Symbol	Motor	Brake
A31	DC motor	N/A

- LZG**5*

Symbol	Motor	Brake
A51	DC motor	N/A

● Autoswitch part no.

Type	Electrical entry	Indicator light	Wiring	Load voltage	Autoswitch part no.	Lead wire length (m) 0.5(Nil)	3 (L)	5 (Z)	Prewire connector	Applicable load: IC circuit	Applicable load: Relay PLC
Solid state autoswitch	Grommet	Yes	3 wire (NPN)	DC5 to 24V	M9N	●	●	○	○	IC circuit	Relay PLC
			3 wire (PNP)		M9P	●	●	○	○		
			2 wire	DC12 to 24V	M9B	●	●	○	○	-	

*Lead wire length symbol

0.5m	Nil	Ex) M9N
3m	L	M9NL
5m	Z	M9NZ

*Solid state autoswitch of ○ is made to order.

9. EMC directive

The EMC directive is applied to the DC motor fitted to the electric cylinder LZG series and the directional control equipment as a combination.

Please refer the operation manual of directional control equipment for the test condition at the third party.

*How to use the protection ground terminal:

For the emission noise reduction, ground to the protection ground terminal on the end of motor, using a metal P-clip on to the shielded party of the motor output terminal cable.

(At the directional control equipment end of the motor output terminal cable attach to the frame ground.)

- The P-clip and the motor output terminal cable to be supplied by the customer.

-If required SMC can also supply the motor output terminal cable bythe ordering code as shown below.

Motor output terminal cable :
LC3F2-1-C3-02-1
Cable length 02 : 2m
05 : 5m