

# Directional Control Driver for Electric Cylinder

Series **LC3F2**



LC3F212-5A3□

LC3F212-5A5□

**Able to control the stroke with only ON/OFF signals**

Directional control driver like a solenoid valve

**Able to set thrust arbitrarily.**

Thrust can be adjusted by adjustment trimmer

**Able to control with only 3 different types of input signals**

① Directional instruction    ② Thrust selection    ③ Output ON/OFF

**Can be operated manually**

Maintenance performance for wiring check has been improved

## Product Specifications

Model	LC3F212-5A3□	LC3F212-5A5□
Power supply voltage	24 VDC ± 10%	
Front side label color	Max. 1.3 A	Max. 2.3 A
Input signal	Gray	
Selection of thrust	Blue	
Operating temperature range	Photocoupler input 24 VDC ±10% Max. 8 mA/point	
Operating humidity range	100% or set value (setting range 10 to 70% F.S.)	
Environment	+5 to 40°C	
Display LED	35 to 85% Rh (with no condensation)	
Weight	Indoor (Direct sunlight should be avoided.) No corrosive gas, inflammable gas, oil mist or dust particle	
	POWER, A-PHASE, OFF, SET	
	145 g	

# Directional Control Driver for Electric Cylinder

## Series LC3F2



### How to Order

**LC3 F2 12 5 A3 B**

Series      Power supply      Applicable motor      Housing set (Connector set)

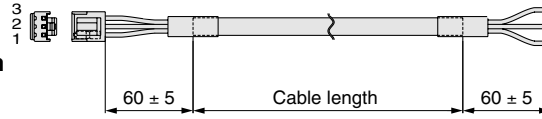
<b>F2</b> Small sized DC motor driver	<b>5</b> 24 VDC	<b>A3</b> DC motor (cylinder size 3)	<b>B</b> Nothing included.
		<b>A5</b> DC motor (cylinder size 5)	

### Option

#### ● Cable for power supply terminal

LC3F2 1 C1-02-1

Cable type	Cable length
<b>C1</b> Cable for CN1 power supply terminal	<b>01</b> 1 m <b>02</b> 2 m



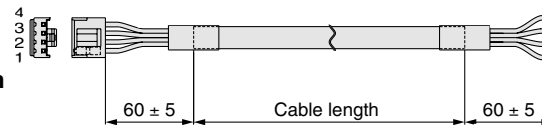
**CN1 Power Supply Terminal Table**

Terminal	Function	Pin number	Optional cable color
FG	Frame ground	1	Yellow/Green
DC (+)	Driver power supply (+24 V)	2	Brown
DC (-)	Driver power supply (0 V)	3	Blue

#### ● Cable for control terminal

LC3F2 1 C2-02-1

Cable type	Cable length
<b>C2</b> Cable for CN2 control terminal	<b>01</b> 1 m <b>02</b> 2 m



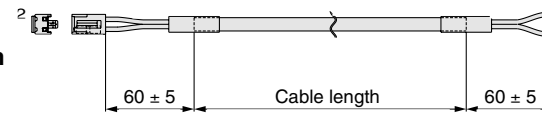
**CN2 Control Terminal Table**

Terminal	Function	Pin number	Optional cable color
COM	Common terminal	1	White
ON	Output ON command input	ON: Motor output	Red
		OFF: No motor output	
SET	Adjusted thrust command input	ON: Adjusted thrust	Yellow
		OFF: 100% thrust (Max. thrust)	
A-PHASE	Traveling direction command input	ON: A-PHASE (Retracted side)	Orange
		OFF: B-PHASE (Extended side)	

#### ● Cable for motor output terminal

LC3F2 1 C3-02-1

Cable type	Cable length
<b>C3</b> Cable for CN3 motor output terminal	<b>02</b> 2 m <b>05</b> 5 m



**CN3 Motor Output Terminal Table**

Terminal	Function	Pin number	Optional cable color
OUTA	Motor output A (Blue)	1	Blue
OUTB	Motor output B (Red)	2	Red

#### ● Housing set (Connector set)

<b>LC3F2 1-C0</b>	Housing for power supply terminal (Connector)	1 pc.	VHR-3N: J.S.T. Mfg Co., Ltd.)
	Housing for control terminal (Connector)	1 pc.	VHR-4N: J.S.T. Mfg Co., Ltd.)
	Housing for motor output terminal (Connector)	1 pc.	VHR-2N: J.S.T. Mfg Co., Ltd.)
	Contact (Connector pin)	12 pcs.	BVH-21T-P1.1: J.S.T. Mfg Co., Ltd.)

### ⚠ Caution

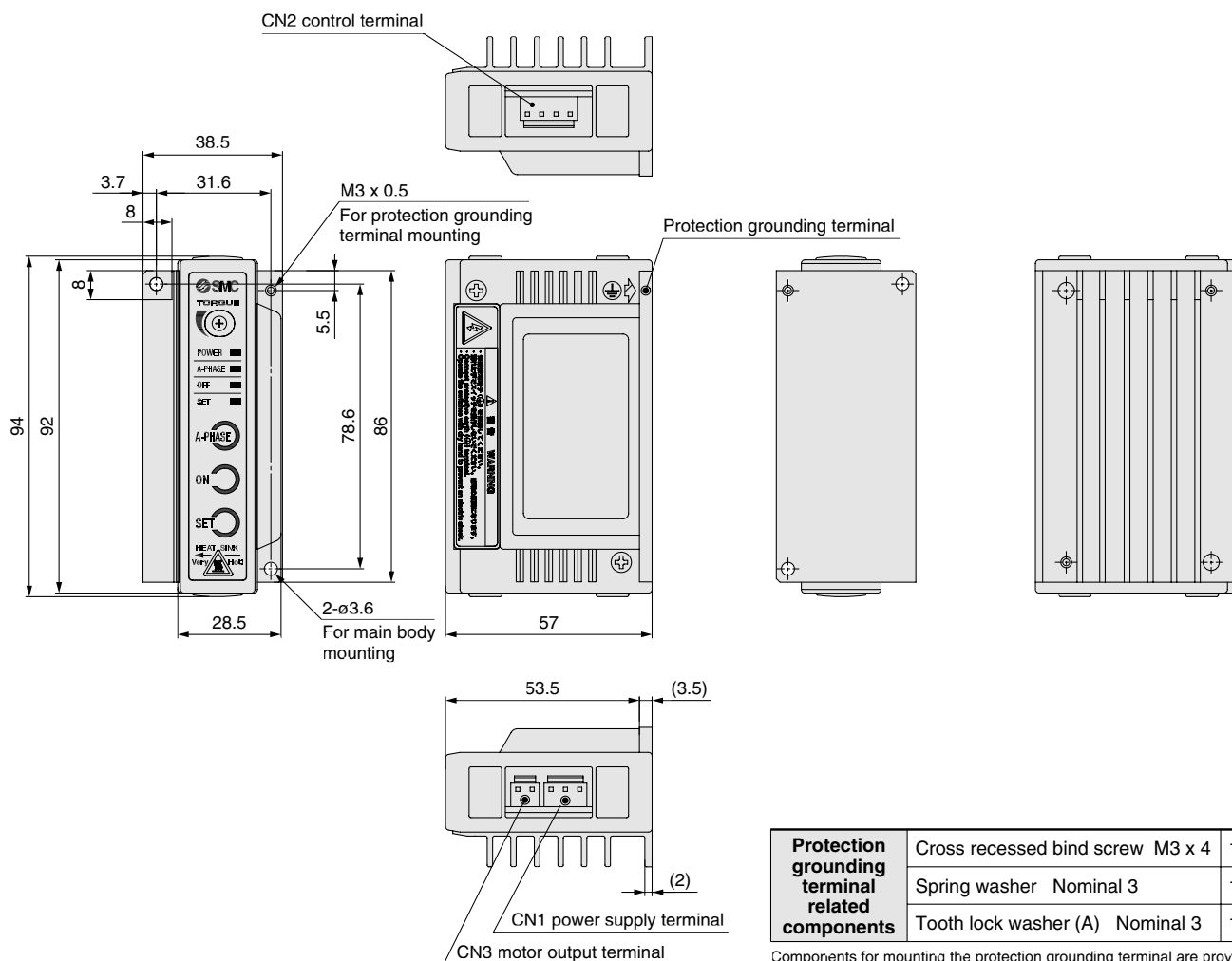
- **Do not apply repetitive bending or pulling stress to the cable.**  
Wiring with repetitive bending or pulling stress to the cable will likely cause the cable to break.
- **In the event of crimping the contact (connector pin) and wire use the specific tools as well as the recommended cable**  
Crimping tool: YC-160R (J.S.T. Mfg Co., Ltd.)  
Pulling tool: EJ-NV (J.S.T. Mfg Co., Ltd.)  
Recommended cable connection (common for individual cable) AWG2<sup>2</sup> (0.5 mm<sup>2</sup>) Insulated wire O.D. 1.7 to 3.0 mm with shield  
Heat resistance is more than 80°C.  
Maximum cable length (
 

CN1 cable for power supply terminal	2 m
CN2 cable for control terminal	2 m
CN3 cable for motor output terminal	5 m
- **Shield is attached with an optional cable for the LC3F2 series.**  
When grounding a shield, remove the sheath and use a metal U-crip or P-crip.

## Applicable Cylinder Table

Cylinder part no.	Applicable directional control driver
L□Z□3□-□□□A3□□-□□□□	LC3F212-5A3□
L□Z□5□-□□□A5□□-□□□□	LC3F212-5A5□

## Dimensions

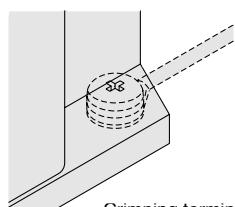


## How to Mount

Mount the directional control driver vertically against the wall, using two mounting screw holes, so the front side (on which its adjustment trimmer and manual switch are located) is facing to an operator

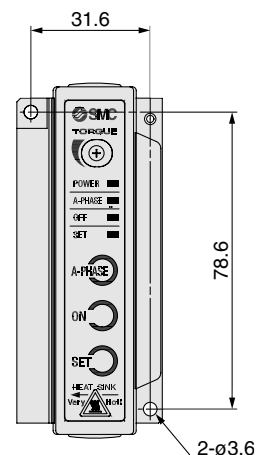
Applicable mounting screw: M3 (2 pcs.) [to be supplied by customer]

### \* How to mount a protection grounding terminal



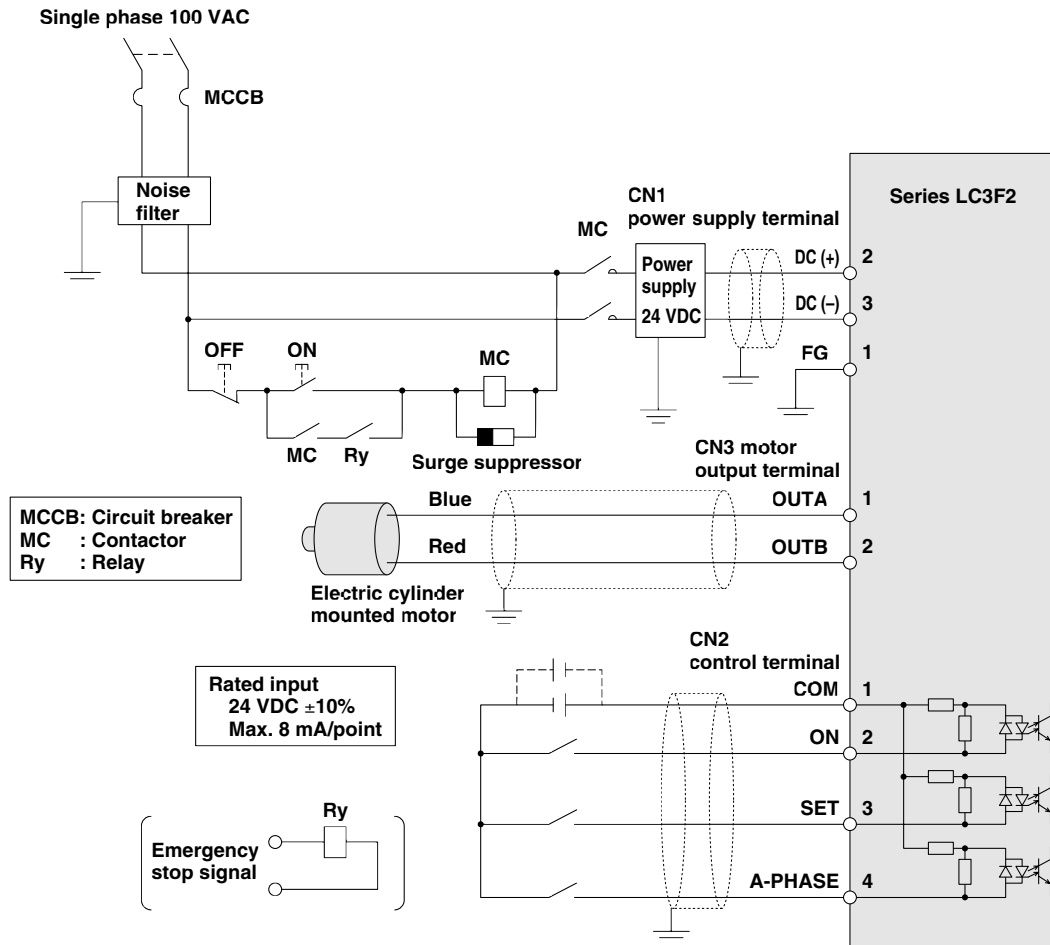
- Cross recessed bind screw (Accessory) M3 x 4
- Spring washer Nominal 3 (Accessory)
- Crimping terminal
- Tooth lock washer (A) (Accessory) Nominal 3

Crimping terminal and grounding cable are supplied by customer



# Series LC3F2

## Wiring Example

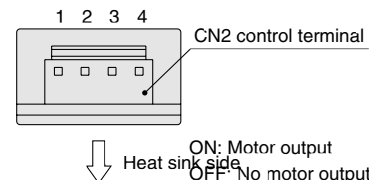
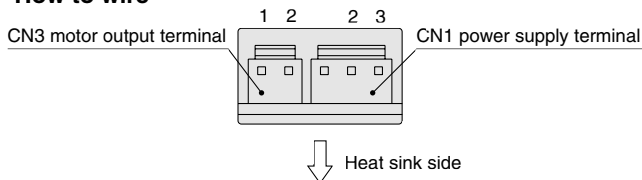


For System Chart, refer to Features 1

## ⚠ Caution

There is no emergency stop function or power supply switch in the directional control driver. Please be sure to provide an emergency stop and power supply insulation (insulator) device as a total machine equipment, referencing the above wiring examples. Also, please be sure to turn off the power supply for the whole equipment prior to wiring the directional control driver.

### How to wire



### CN1 Power Supply Terminal

Pin no.	Terminal	Function
1	FG	Frame ground
2	DC (+)	Driver power supply (+24 V)
3	DC (-)	Driver power supply (0 V)

Housing: VHR-3N (J.S.T. Mfg Co., Ltd.)  
Contact: BVH-21T-P1 (J.S.T. Mfg Co., Ltd.)

### CN3 Motor Output Terminal

Pin no.	Terminal	Function
1	OUTA	Motor output A (Blue wire)
2	OUTB	Motor output B (Red wire)

Housing: VHR-2N (J.S.T. Mfg Co., Ltd.)  
Contact: BVH-21T-P1 (J.S.T. Mfg Co., Ltd.)

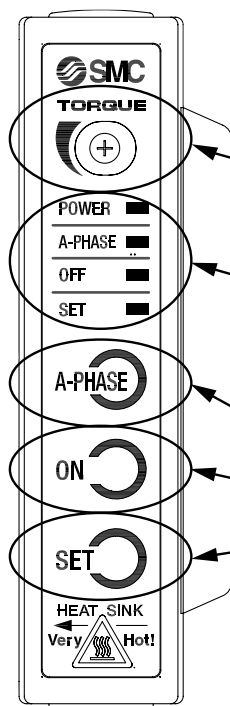
### CN2 Control Terminal

Pin no.	Terminal	Function
1	COM	Common terminal
2	ON	Output ON command input
3	SET	Adjusted thrust command input
4	A-PHASE	Traveling direction command input

Housing: VHR-4N (J.S.T. Mfg Co., Ltd.)  
Contact: BVH-21T-P1.1 (J.S.T. Mfg Co., Ltd.)

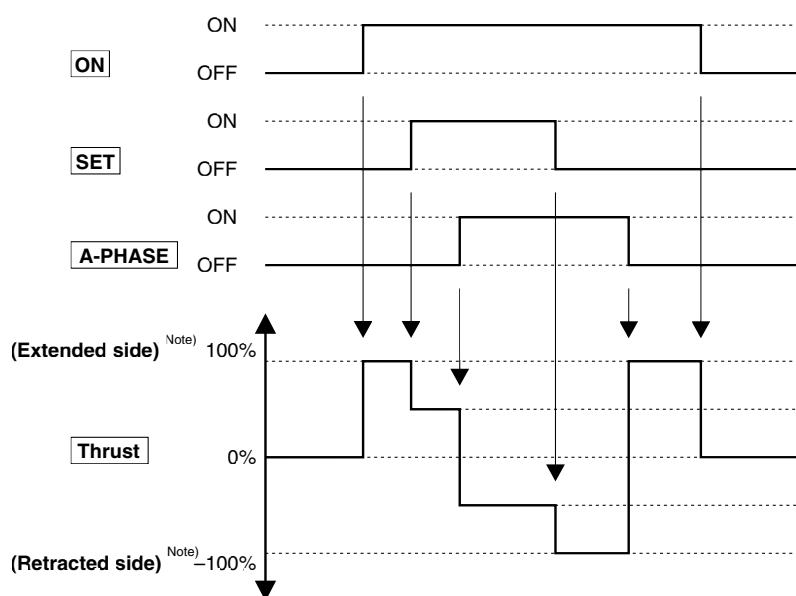
Note) For the travelling direction (retracted, extended side), refer to the dimensions in page 4, 6, 10 and 11.

## Description of Each Part and its Function



Category	Description	Details
Trimmer	Thrust adjustment trimmer	Thrust changes through adjustment.
Indicator light	POWER	Light illuminates when power is supplied.
	A-PHASE	Light illuminates by A-PHASE command. (Travelling to the retracted side when illuminated)
	OFF	Light illuminates when turning OFF. (No motor output is generated when illuminated.)
	SET	Light illuminates by SET command. (Thrust set by the thrust adjustment trimmer, when illuminated.)
Manual switch	A-PHASE	A-PHASE command while pressing (Travelling to the retracted side)
	ON	ON command while pressing (Motor output will be generated.)
	SET	SET command while pressing (Thrust set by the thrust adjustment trimmer will be outputted.)

## Timing Chart



Note) For the travelling direction (retracted, extended side), refer to the dimensions in page 4, 6, 10 and 11

## CN2 Control Terminal

Pin no.	Terminal	Function	
1	COM	Common terminal	
2	ON	Output ON command input	ON: Motor output OFF: No motor output
3	SET	Adjusted thrust command input	ON: Adjusted thrust OFF: 100% thrust (Max. thrust)
4	A-PHASE	Traveling direction command input	ON: A-PHASE (Retracted side) <sup>Note)</sup> OFF: B-PHASE (Extended side) <sup>Note)</sup>

Housing: VHR-4N (J.S.T. Mfg Co., Ltd.)

Contact: BVH-21T-P1.1 (J.S.T. Mfg Co., Ltd.)

Note) For the travelling direction (retracted, extended side), refer to the dimensions in page 4, 6, 10 and 11.



# Directional Control Driver Precautions 1

Be sure to read this before handling.

## Directional Control Driver

### Caution on Handling

#### ⚠ Warning

1. Never touch the directional control driver inside. It will likely lead to an electrical shock or other trouble.
2. Use only the designated combination between motor and directional control driver.

#### ⚠ Caution

1. Do not disassemble and modify. It may result in the trouble, malfunction, fire, etc.
2. Do not touch for a while when being energized or after cutting off the power source because it is high temperature.
3. If a fire or danger against the human being is expected by abnormal heat generation of the product, emitting fume and catching on fire, etc., cut off the power supply for the main body and the system immediately.

### Power Supply

#### ⚠ Caution

1. In cases where voltage fluctuations greatly exceed the required voltage, a constant voltage transformer, etc., should be used to allow operation within the required range.
2. Use a power supply that has low noise between lines and between power and ground. In cases where noise is high, an isolation transformer should be used.
3. The power supply line and the interface power supply line must be wired separately in different systems.
4. To prevent surges from lightning, connect a varistor for lightning. Ground the surge absorber for lightning separately from the grounding of the directional control driver.

### Grounding

#### ⚠ Caution

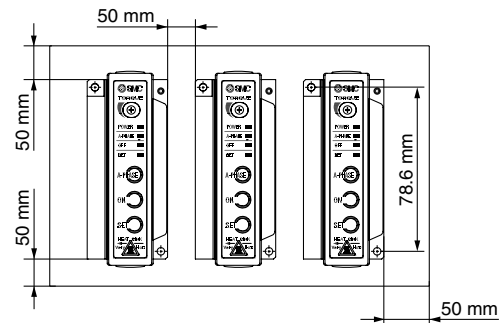
1. Be sure to carry out grounding in order to ensure the noise tolerance of the directional control driver.
2. Dedicated grounding should be used as much as possible. Grounding should be to a type 3 ground. (Ground resistance of 100  $\Omega$  or less.)
3. Grounding should be as close as possible to the directional control driver, and the ground wires should be as short as possible.
4. In the unlikely event that malfunction is caused by the ground, disconnected it from the ground.

### Mounting

#### ⚠ Caution

1. Mount the directional control driver on incombustible materials. Mounting on combustible materials directly or mounting closely to it may lead to a fire.
2. Consider the cooling period, so that the operating temperature of main body should be within the range of specifications. Also, allow enough distance from each side of the main body, construction and the parts.

Cooling should be considered, so the surface temperature of a heat sink should not be more than 50°C even though the temperature is within the operating range.



3. Avoid placing with large-sized solenoid contact apparatus or vibrating source such as no fuse insulator and then make a separate panel or mount in the distance.
4. Mounting should enable the connectors to be inserted or removed after installation.
5. If there are concave or convex or distorted parts on the mounting face of a directional control driver, an unreasonable force can be applied to the frame or case, which can cause trouble. Mount on the flat face.

### Wiring

#### ⚠ Danger

1. Adjustment, installation, or wiring changes should be conducted after power supply to this product is turned off. Otherwise, there is a possibility of an electrical shock.

#### ⚠ Caution

1. Wiring should be performed correctly.  
For each terminal, voltages other than stipulated in the operation manual should not be applied. Otherwise, the product may break.
2. Connect the housing securely.
3. Treat the noise securely.  
If the noise is at the same wavelength as the signal lines, it will lead to malfunction. As a countermeasure, separate the high and low electrical lines and shorten the length of wiring, etc.
4. When using a cable made by oneself, confirm the electric wire is of a proper gauge as mentioned in the instruction manual and it is not affected by a noise before using.



# Directional Control Driver Precautions 2

Be sure to read this before handling.

## Wiring

### Warning

- 1. Avoid repeatedly bending and/or stretching the cables.**  
Repeatedly applying bending stress and/or stretching force to the cables may result in broken lead wires.
- 2. Avoid incorrect wiring.**  
Depending on the type of incorrect wiring, the directional control driver may be damaged.
- 3. Perform wiring when the power is turned off.**  
The directional control driver may be damaged and malfunction.
- 4. Do not wire with power lines or high voltage lines.**  
Conduct wiring for a directional control driver separately from power lines or high voltage lines to avoid interference from the noise or surge of the power lines or high voltage lines. This may result in malfunction.
- 5. Confirm that the wiring is properly insulated.**  
Be certain that there is no faulty wiring insulation (contact with other circuits, improper insulation between terminals, etc.) because the directional control driver may be damaged due to excessively applied voltage or current flow to it.

## Operating Environment

### Warning

- 1. Do not use in an environment subjected to temperature cycle.**  
If used in an environment where temperature cycling occurs, other than the usual temperature change, the internal directional control driver may be adversely effected.
- 2. Do not use in a place that has excessive electrical surge generation.**  
When there are units (solenoid type lifter, high frequency induction furnace, motor, etc.) which generate a large amount of surge in an area around the directional control driver, deterioration or damage may occur to the internal circuit elements of the directional control driver. Avoid sources of surge generation and crossed lines.
- 3. Select a product type that has built-in surge absorbing elements for a load, such as relays and solenoid valves employed for driving voltage generating load directly.**
- 4. Avoid use in the following environments.**
  1. Locations with a lot of debris or dust, or where chips may enter.
  2. Locations where the ambient temperature exceeds the operating temperature range specified in each model. (Refer to the specifications.)
  3. Locations where the ambient humidity exceeds the operating humidity range specified in each model. (Refer to the specifications.)
  4. Locations where corrosive or combustible gases are generated.
  5. Locations where strong magnetic or electric fields are generated.
  6. Locations where direct vibration or impact shock, etc., will be applied to the cylinder unit.
  7. Locations where a lot of dusts, water drops and oil drops are applied to a product.

## Adjustment and Operation

### Warning

- 1. Do not short the loads.**  
Short on the load of the directional control driver indicates an error, but it may cause over current and damage the directional control driver.
- 2. Do not operate or conduct any settings with wet hands.**  
An electric shock may result from wet hands.
- 3. When operating the manual switch, avoid making contact with the workpiece.**  
Contact with the workpiece may cause injury.

### Caution

- 1. Do not push the manual switch with sharp pointed items.**  
Sharp pointed items may cause manual switch damage.
- 2. Do not touch the heat sink parts of the directional control driver.**  
Conduct operation after confirming that the machine is cool since it gets hot while in operation.
- 3. When adjusting the trimmer, the following conditions should be observed.**
  1. Adjust it with a supply pressure of 4.9 N or less.
  2. Adjust the adjustment parts with 68.5 mN or less.

## Maintenance

### Warning

- 1. Periodically perform a maintenance of the product.**  
Confirm that the piping and bolts are securely tightened. Unintentional malfunction of a system's components may occur as a result of a cylinder malfunction.
- 2. Do not disassemble, modify (including change of printed circuit board) or repair.**  
Disassembly or modification may result in injury or failure.

### Caution

- 1. Confirm the range of movement of a workpiece (a slider) before connecting the driving power supply or turning on the switch.**  
The movement of the work may cause an accident.



# Directional Control Driver Precautions 3

Be sure to read this before handling.

## Caution on Design and Selection

### Warning

#### 1. Conduct operation at regulated voltage.

The product may not function correctly or the directional control driver section may be damaged if used with any other voltage than the specified regulated voltage.

#### 2. Operate within the limit of the specification range.

If operated outside of the specification range, there is a possibility of fire, malfunction, and or cylinder damage. Operate after confirming the required specifications.

#### 3. To prevent any damage by product failure or malfunction, plan and construct a backup system beforehand, such as multiplexing the components and equipment, employing failure free planning, etc.

#### 4. Secure the space for maintenance.

When planning, consider the space to be required for product checkup and maintenance.

#### 5. Provide a protective cover when there is a risk of human injury.

If a driven object and or moving parts of a cylinder pose a danger to human injury, design the structure to avoid contact with the human body





# Directional Control Driver Precautions 4

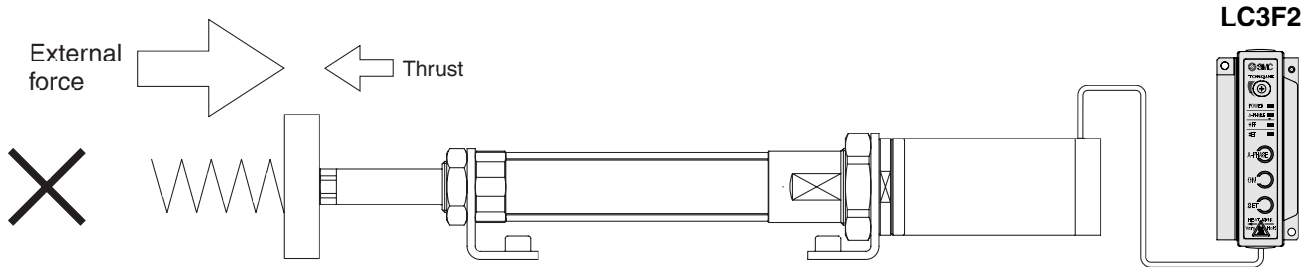
Be sure to read this before handling.

## Caution on Design and Operation

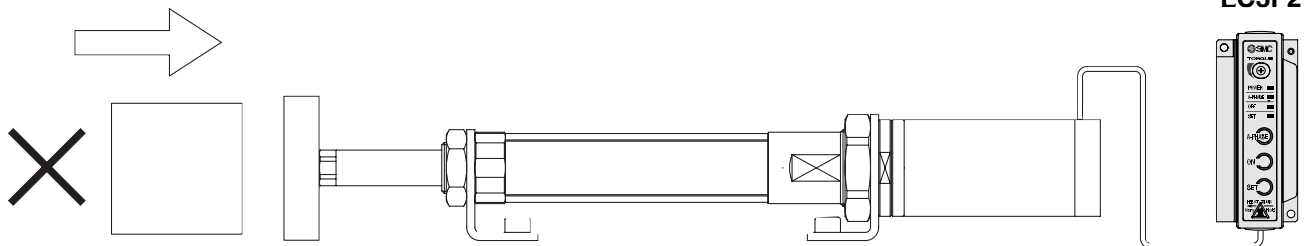
1. If an electric cylinder with DC motor should be rotated by the larger external force than the generated thrust, the reverse inrush voltage generated may cause adverse effects on the electric cylinders directional control driver and result in malfunction or damage to the product.

Example)

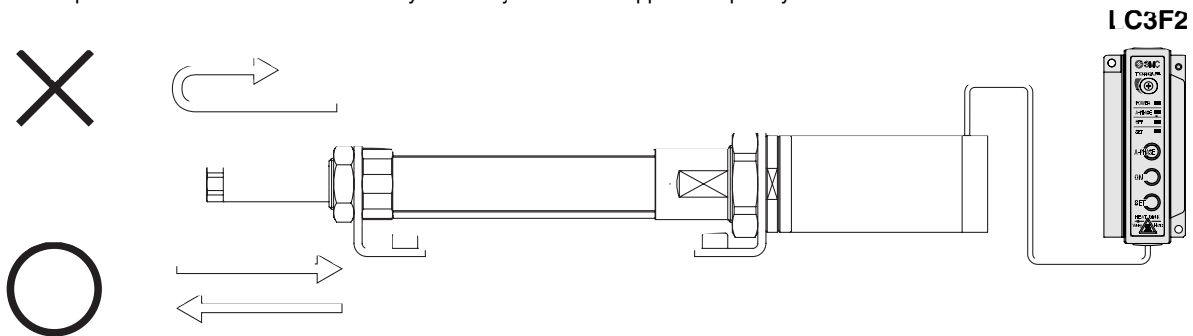
- Do not push or pull a cylinder rod, applying a larger load than the generated thrust. (Please use caution if the generated thrust should be switched over between a high thrust and a low thrust.)



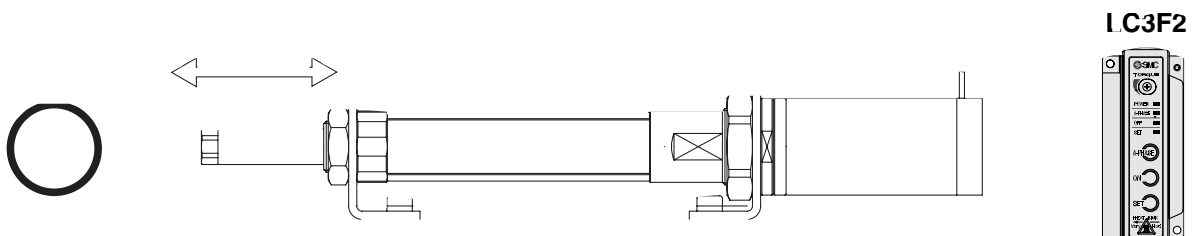
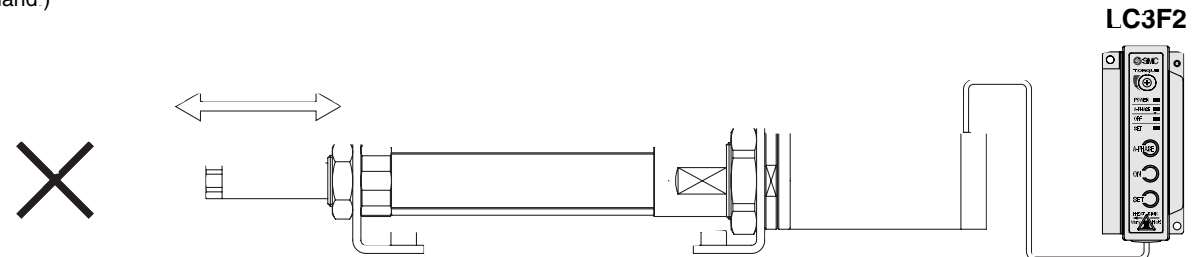
- Do not use this product by stopping it with a load or external force. (control operation)



- Command an operation in the reverse direction only after a cylinder rod stopped completely.

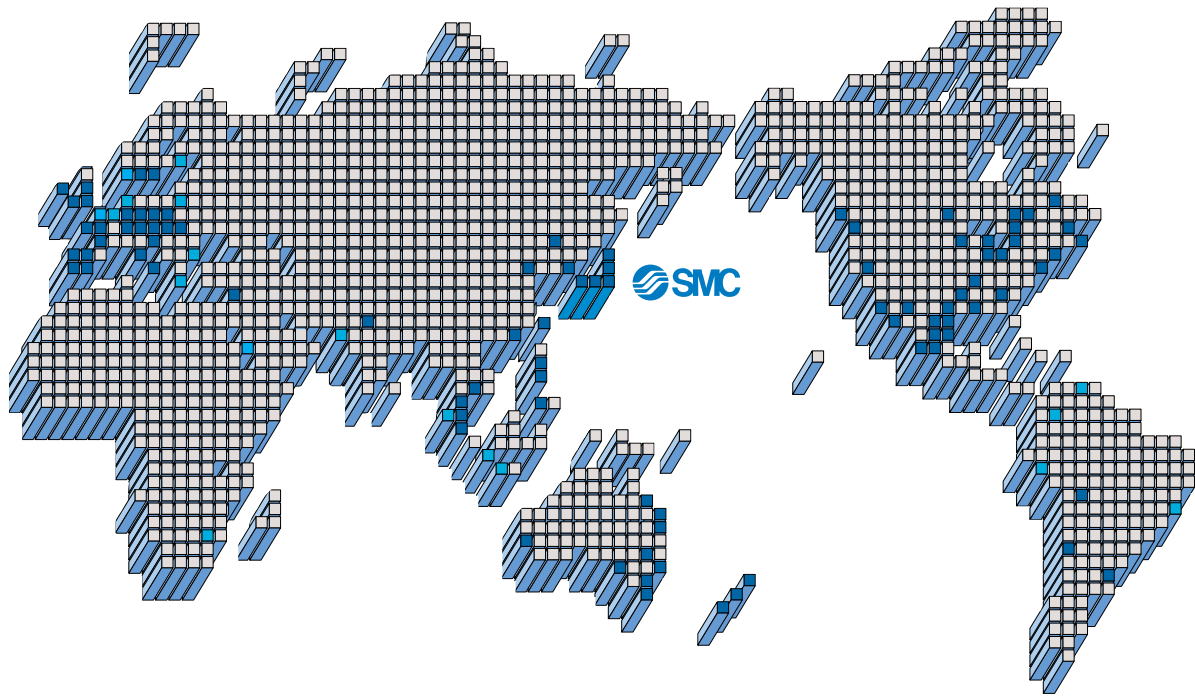


- Do not operate a cylinder rod with an external force when the electric cylinder directional control driver is turned off or output is in the off state. (If a cylinder rod needs to be moved manually for the purpose of adjustment, etc., be sure to remove the CN3 motor output terminal beforehand.)





## SMC'S GLOBAL MANUFACTURING, DISTRIBUTION AND SERVICE NETWORK



### EUROPE

#### AUSTRIA

SMC Pneumatik GmbH

#### BELGIUM

SMC Pneumatics N.V./S.A.

#### BULGARIA

SMC Industrial Automation Bulgaria EOOD

#### CROATIA

SMC Industrijska automatika d.o.o.

#### CZECH REPUBLIC

SMC Industrial Automation CZ s.r.o.

#### DENMARK

SMC Pneumatik A/S

#### ESTONIA

SMC Pneumatics Estonia OU

#### FINLAND

SMC Pneumatics Finland OY

#### FRANCE

SMC Pneumatique SA

#### GERMANY

SMC Pneumatik GmbH

#### HUNGARY

SMC Hungary parti Automatizalasi Kft.

#### IRELAND

SMC Pneumatics (Ireland) Ltd.

#### ITALY

SMC Italia S.p.A.

#### LATVIA

SMC Pneumatics Latvia SIA

#### LITHUANIA

SMC Pneumatics Lithuania, UAB

#### NETHERLANDS

SMC Pneumatics BV.

#### NORWAY

SMC Pneumatics Norway A/S

#### POLAND

SMC Industrial Automation Polska Sp.z o.o.

#### ROMANIA

SMC Romania s.r.l.

#### RUSSIA

SMC Pneumatik LLC

#### SLOVAKIA

SMC Priemyselna automatizacia, s.r.o.

#### SLOVENIA

SMC INDUSTRIJSKA AVTOMATIKA d.o.o.

#### SPAIN/PORTUGAL

SMC España, S.A.

#### SWEDEN

SMC Pneumatics Sweden AB

#### SWITZERLAND

SMC Pneumatik AG.

#### UK

SMC Pneumatics (U.K.) Ltd.

### ASIA

#### CHINA

SMC (China) Co., Ltd.

#### HONG KONG

SMC Pneumatics (Hong Kong) Ltd.

#### INDIA

SMC Pneumatics (India) Pvt. Ltd.

#### INDONESIA

PT SMC Pneumatics Indonesia

#### MALAYSIA

SMC Pneumatics (S.E.A.) Sdn. Bhd.

#### PHILIPPINES

SHOKETSU-SMC Corporation

#### SINGAPORE

SMC Pneumatics (S.E.A.) Pte. Ltd.

#### SOUTH KOREA

SMC Pneumatics Korea Co., Ltd.

#### TAIWAN

SMC Pneumatics (Taiwan) Co., Ltd.

#### THAILAND

SMC Thailand Ltd.

### NORTH AMERICA

#### CANADA

SMC Pneumatics (Canada) Ltd.

#### MEXICO

SMC Corporation (Mexico) S.A. de C.V.

#### USA

SMC Corporation of America

### SOUTH AMERICA

#### ARGENTINA

SMC Argentina S.A.

#### BOLIVIA

SMC Pneumatics Bolivia S.R.L.

#### BRAZIL

SMC Pneumaticos Do Brazil Ltda.

#### CHILE

SMC Pneumatics (Chile) S.A.

#### VENEZUELA

SMC Neumatica Venezuela S.A.

### OCEANIA

#### AUSTRALIA

SMC Pneumatics (Australia) Pty. Ltd.

#### NEW ZEALAND

SMC Pneumatics (NZ) Ltd.

## SMC Corporation

1-3-4 Shinbashi, Minato-ku, Tokyo 105-3659 JAPAN

TEL: 03-3502-2740 FAX: 03-3508-2480

URL: <http://www.smcworld.com>

© 2005 SMC Corporation All Rights Reserved

Specifications are subject to change without prior notice and any obligation on the part of the manufacturer.

D-DN

1st printing JX printing JX 120DN Printed in Japan.

This catalog is printed on recycled paper with concern for the global environment.