



Installation & Maintenance Manual

4-axis Step Motor Controller

(EtherNet/IP™ type)

Series JXC93



1 Safety Instructions

This manual contains essential information for the protection of users and others from possible injury and/or equipment damage.

- Read this manual before using the product, to ensure correct handling, and read the manuals of related apparatus before use.
- Keep this manual in a safe place for future reference.
- These instructions indicate the level of potential hazard by label of "Caution", "Warning" or "Danger", followed by important safety information which must be carefully followed.
- To ensure safety of personnel and equipment the safety instructions in this manual and the product catalogue must be observed, along with other relevant safety practices.

Caution	CAUTION indicates a hazard with a low level of risk which, if not avoided, could result in minor or moderate injury.
Warning	WARNING indicates a hazard with a medium level of risk which, if not avoided, could result in death or serious injury.
Danger	DANGER indicates a hazard with a high level of risk which, if not avoided, will result in death or serious injury.

This product is class A equipment that is intended for use in an industrial environment. There may be potential difficulties in ensuring electromagnetic compatibility in other environments due to conducted as well as radiated disturbances.

Warning

- The compatibility of the product is the responsibility of the person who designs the equipment or decides its specifications.** Since the product specified here is used under various operating conditions, its compatibility with specific equipment must be decided by the person who designs the equipment or decides its specifications based on necessary analysis and test results. The expected performance and safety assurance of the equipment will be the responsibility of the person who has determined its compatibility with the product. This person should also continuously review all specifications of the product referring to its latest catalog information, with a view to giving due consideration to any possibility of equipment failure when configuring the equipment.
- Only personnel with appropriate training should operate machinery and equipment.** The product may become unsafe if handled incorrectly. The assembly, operation and maintenance of machines or equipment must be performed by an operator who is appropriately trained and experienced.
- Do not attempt to service or replace product and machinery/equipment until safety is confirmed.**
 1. The inspection and maintenance of machinery/equipment should only be performed after measures to prevent falling or runaway of the driven objects have been confirmed.
 2. When the product is to be removed, confirm that the above safety measures are implemented and the power from any appropriate source is cut, and read and understand the specific product precautions of all relevant products carefully.
 3. Before machinery/equipment is restarted, take measures to prevent unexpected operation and malfunction.

1 Safety Instructions (Continued)

Warning

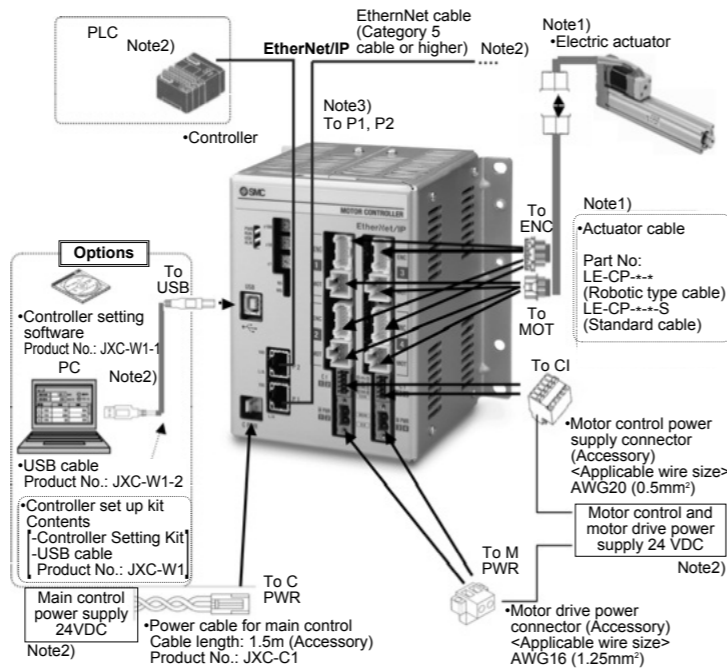
- Contact SMC beforehand and take special consideration of safety measures if the product is to be used in any of the following conditions:**
 1. Conditions and environments outside of the given specifications, or use outdoors or in a place exposed to direct sunlight.
 2. Installation on equipment in conjunction with atomic energy, railways, air navigation, space, shipping, vehicles, military, medical treatment, combustion and recreation, or equipment in contact with food and beverages, emergency stop circuits, clutch and brake circuits in press applications, safety equipment or other applications unsuitable for the standard specifications described in the product catalog.
 3. An application which could have negative effects on people, property, or animals requiring special safety analysis.
 4. Use in an interlock circuit, which requires the provision of double interlock for possible failure by using a mechanical protective function, and periodical checks to confirm proper operation.

Caution

- The product is provided for use in manufacturing industries.** The product herein described is basically provided for peaceful use in manufacturing industries. If considering using the product in other industries, consult SMC beforehand and provide specifications or a contract, if necessary. If anything is unclear, contact your nearest sales branch.

Refer to the operation manual on the SMC website (URL <http://www.smcworld.com>).

2 Product configuration



- Note 1) Connected actuators should be ordered separately.
 Note 2) PLC, Ethernet cable with category 5 or higher, PC and 24VDC power supply should be supplied by the user.
 Note 3) Cable is possible to connect to either P1 or P2. Follow the topology of EtherNet/IP communication for further direction.

Warning

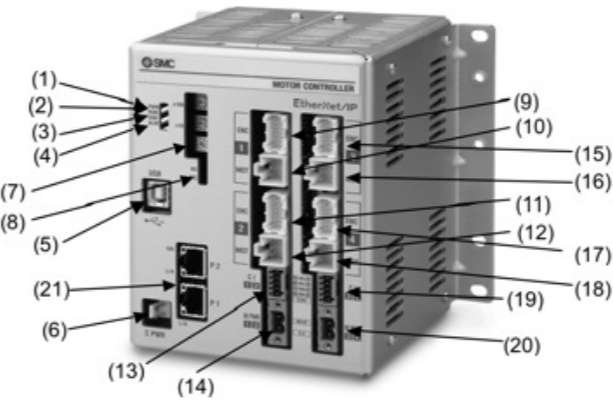
Use "USB cable (JXC-W1-2)" when communicating with a PC.

Caution

Connector "CI3 4" must be connected even when axis 3 and 4 are not used. If not, a "Modbus Error" alarm will be generated.

3 Parts Description

Detail of the controller parts.



No.	Display	Description	Details
1	PWR	Power supply LED (green)	OFF: Power supply OFF Green LED is ON: Power supply ON
2	RUN	Operating LED (green)	OFF: Stop Green LED is ON: Operation by EtherNet/IP Green LED is flashing: Operation by USB communication
3	USB	USB LED (green)	OFF: USB not connected Green LED is ON: USB connected
4	ALM	Alarm LED (red)	OFF: No alarm Red LED is ON: Alarm condition
5	USB	Serial communication	Connect to a PC using a USB cable.
6	C PWR	Main control power supply connector (2 pin)	Main control power supply (+)(-)
7	x100 x10 x1	IP address setting switches	Switch to set the 4th. byte of IP address by X1, X10 and X100.
8	MS, NS	Communication status LED	Display the status of the EtherNet/IP communication.
9	ENC 1	Encoder connector (16 pins)	Axis 1: Connect the actuator cable.
10	MOT 1	Motor power connector (6 pins)	
11	ENC 2	Encoder connector (16 pins)	Axis 2: Connect the actuator cable.
12	MOT 2	Motor power connector (6 pins)	
13	CI 1 2	Motor control power supply connector	Motor control power supply(+), Axis 1 stop(+), Axis 1 unlock(+), Axis 2 stop(+), Axis 2 unlock(+)
14	M PWR 1 2	Motor drive power connector	Axis 1, Axis 2 Motor drive power(+), common(-)
15	ENC 3	Encoder connector (16 pins)	Axis 3: Connect the actuator cable.
16	MOT 3	Motor power connector (6 pins)	
17	ENC 4	Encoder connector (16 pins)	Axis 4: Connect the actuator cable.
18	MOT 4	Motor power connector (6 pins)	
19	CI 3 4	Motor control power supply connector	Motor control power supply(+), Axis 3 stop(+), Axis 3 unlock(+), Axis 4 stop(+), Axis 4 unlock(+)
20	M PWR 3 4	Motor drive power connector	Axis 3, Axis 4 Motor drive power(+), common(-)
21	P1, P2	EtherNet/IP communication connector	Connector for EtherNet/IP communication.

Note) The connector is included.

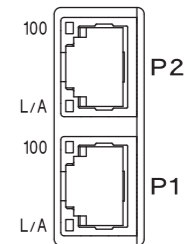
3 Parts Description (Continued)

Details of NS and MS LED's (item 8)



LED	Details		
NS	EtherNet/IP communication status	OFF	Main control power supply is OFF or IP address is not set
		Green LED is ON	Connection is established
		Green LED is flashing	Connection is not established
		Red LED is flashing	Connection time out
MS	EtherNet/IP controller status	OFF	Main control power supply is OFF
		Green LED is ON	Operating normally
		Green LED is flashing	Setting error
		Red LED is flashing	Recoverable error
		Red LED is ON	Unrecoverable error

Details of LED's on connector P1, P2 (item 21)



LED	Details		
P2-100	EtherNet/IP communication speed	OFF	10Mbps
		Orange LED is ON	100Mbps
P2-L/A	Data transmission status	OFF	Communication is not established. No data transmission.
		Green LED is ON	Communication is established. No data transmission.
P1-100	EtherNet/IP communication speed	OFF	10Mbps
		Orange LED is ON	100Mbps
P1-L/A	Data transmission status	OFF	Communication is not established. No data transmission.
		Green LED is ON	Communication is established. No data transmission.
		Green LED is flashing	Communication is established. Data transmission in progress.

4 Product Specifications

Basic specifications

Item	Specifications	
Number of axes per controller	Max. 4-axis	
Controlled motor	Step motor (servo 24 VDC)	
Encoder	Incremental phase A/B (Encoder resolution 800 pulse/rotation)	
Power supply specification ^{Note1)}	Main control power supply Power supply voltage: 24VDC±10% Max. current consumption: 350 mA Motor drive and motor control power supply Power supply voltage: 24VDC±10% Max. current consumption: Depends on connected actuator. ^{Note2)}	
Serial communication	USB2.0 (Full Speed 12Mbps)	
Memory	Flash ROM and EEPROM	
LED indicator	LED description	Details
	PWR	Power supply status
	RUN	Operation status
	USB	USB connection status
	ALM	Alarm status
	NS	EtherNet/IP communication status
	MS	Controller status
L/A	Data transmission status	
100	EtherNet/IP communication speed	
Lock control	With forced lock-release terminal ^{Note3)}	
Cable length	Actuator cable: 20m maximum	
Cooling method	Natural air cooling	
Operating temperature range	0 to 40°C (No freezing)	
Operating humidity range	90% RH or less (No condensation)	
Storage temperature range	-10 to 60°C (No freezing)	
Storage humidity range	90% RH or less (No condensation)	
Insulation resistance	Between the external terminals and case 50MΩ (500 VDC)	
Weight	1050 g (Direct mounting) 1100 g (DIN rail mounting)	

Note 1) Do not use a power supply with "inrush current protection" for the motor drive power and motor control power supply.

Note 2) Power consumption depends on the actuator connected. Refer to the actuator specifications for further details.

Note 3) Applicable to non-magnetizing lock.

EtherNet/IP specifications

Item	Specifications
Protocol	EtherNet/IP™ ^{Note1)} (Conformance test version CT12)
Communication speed	10Mbps/100 Mbps (automatic negotiation)
Communication method	Full duplex/Half duplex (automatic negotiation)
Setup file	EDS file
Occupied area	Input 16 bytes/Output 16 bytes
IP address setting range	Manual setting by switches: From 192.168.1.1 to 254 Via DHCP server: Arbitrary address
Vendor ID	7h (SMC Corporation)
Product type	2Bh (Generic Device)
Product code	DCh

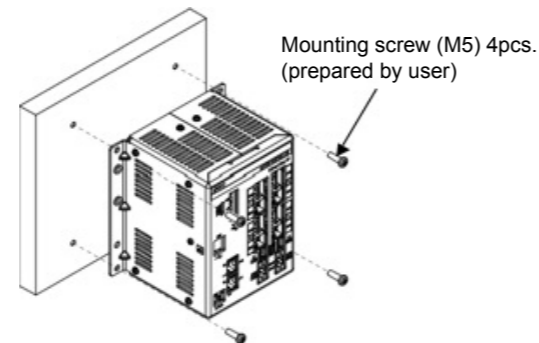
Note 1) EtherNet/IP™ is a trademark of ODVA.

5 Mounting

(1) Mounting

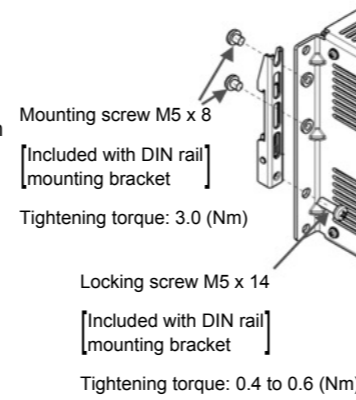
There are two ways to mount the controller.
(Direct mounting and DIN rail mounting)
Controller mounting methods are shown below.

(a) Direct Mounting with four M5 screws

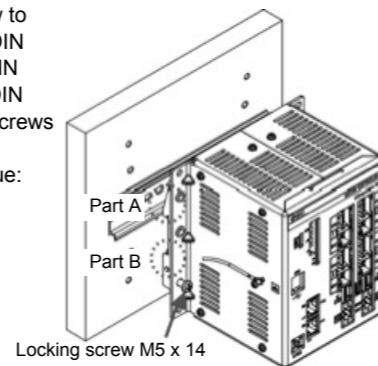


(b) DIN rail mounting

The figure on the right shows how to mount the DIN rail mounting brackets. Secure the DIN rail mounting bracket using 4 mounting screws (M5 x 8 mm), 2 on each side. (Appropriate tightening torque: 3.0 Nm)
Secure the DIN rail mounting bracket using 2 locking screws (M5 x 14 mm), 1 on each side. Tighten for approximately 2 threads. Do not tighten completely.

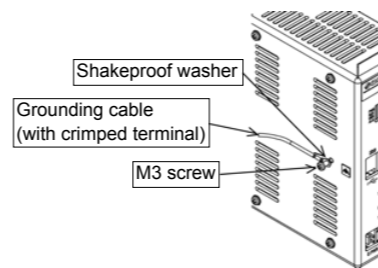


The figure below shows how to mount the controller to the DIN rail. Hook part A on to the DIN rail. Press part B on to the DIN rail and tighten the locking screws (M5 x 14). (Appropriate tightening torque: 0.4 to 0.6 Nm)



(2) Grounding

Fit the grounding cable with crimped terminal between the M3 screw and shakeproof washer as shown below and tighten the screw.



Caution

The cable with crimped terminal and shakeproof washer must be prepared by the user.
The controller must be connected to Ground to reduce noise.

Refer to the operation manual on SMC website (URL <http://www.smcworld.com>).

6 Power supply connector

Connector specifications

The power supply connector included is shown below.

(1) Main control power supply connector: C PWR

Terminal	Function	Description
+24V	Main control power supply(+)	Power supply(+) for main control.
24-0V	Main control power supply(-)	Power supply(-) for main control.

Use the power cable for main control, JXC-C1.

Specifications of the cable are as follows.

Item	Specifications
Wire size	Stranded wire → AWG20 (0.5mm ²) O.D. of sheath → φ1.76
Wire sheath colour	+24V: Brown 24-0V: Blue

(2) Motor drive power connector: M PWR

Terminal	Function	Description
0V	Motor power(-)	Power supply(-) common for M24V terminal, C24V terminal, EMG terminal and LKRLS terminal
M24V	Motor power(+)	Motor drive power supply(+) for Axis 1 and 2 or Axis 3 and 4.

Manufactured by Phoenix Contact
(Part number MSTB2,5/2-STF-5,08)

Prepare the electrical wiring according to the following specifications (to be prepared by the user).

Item	Specifications
Applicable wire size	Single, Stranded wire → AWG16 (1.25mm ²) The rated temperature of the insulation coating should be 60°C or more.
Stripped wire length	7mm ø3.4 or less

When the wire is inserted into the motor drive power connector, insert only the stripped part of the wire.

(3) Motor control power supply connector: C1

Terminal	Function	Description
C24V	Motor control power supply(+)	Power supply side(+) for motor control.
EMG1/EMG3	Stop(+)	Release the stop status(+) of Axis 1 or Axis 3. (Normal operation by applying 24V.)
EMG2/EMG4	Stop(+)	Release the stop status(+) of Axis 2 or Axis 4. (Normal operation by applying 24V.)
LKRLS1/LKRLS3	Unlock(+)	Release the lock status(+) of Axis 1 or Axis 3.
LKRLS2/LKRLS4	Unlock(+)	Release the lock status(+) of Axis 2 or Axis 4.

Manufactured by Phoenix Contact
(Part number FK-MC0,5/5-ST-2,5)

Prepare the electrical wiring according to the following specifications (to be prepared by the user).

Item	Specifications
Applicable wire size	Single, Stranded wire → AWG20 (0.5mm ²) The rated temperature of the insulation coating should be 60°C or more.
Stripped wire length	8mm ø2.0 or less

When the wire is inserted into the motor control power supply connector, insert only the stripped.

Caution

Do not connect multiple wires into one terminal.
Contact failure or short circuit to adjacent wire may lead to malfunction or fire.

Refer to the operation manual on SMC website (URL <http://www.smcworld.com>).

7 Initial Setting Method

Initial setting of the controller and PLC is necessary for the communication with EtherNet/IP.

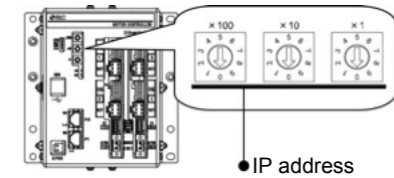
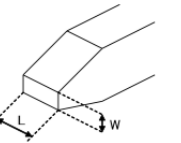
Controller setting (IP address setting)

IP address setting is necessary to distinguish the controller on the EtherNet/IP network. IP address is set by the rotary switches of the controller.

Use a flat blade screwdriver of the size shown below when setting the rotary switches.

< Size >
Width of L: 2.0 to 2.4 (mm)
Thickness of W: 0.5 to 0.6 (mm)

Magnified view of the end of the flat blade screwdriver



Setup			Description
X100	X10	X1	
0	0	0	Remote Control mode
0	0	1	192.168.1.1 (Factory default value)
0	0	1	192.168.1.2
:	:	:	:
2	5	4	192.168.1.254
2	5	5	DHCP mode
2	5	6	Unused
:	:	:	
9	9	9	

Refer to the operation manual on SMC website (URL <http://www.smcworld.com>).

8 How to order 9 Outline with Dimensions (mm) 10 Maintenance 11 Troubleshooting

Refer to the operation manual on the SMC website (URL <http://www.smcworld.com>).

12 Contacts

AUSTRIA	(43) 2262 62280-0	LATVIA	(371) 781 77 00
BELGIUM	(32) 3 355 1464	LITHUANIA	(370) 5 264 8126
BULGARIA	(359) 2 974 4492	NETHERLANDS	(31) 20 531 8888
CZECH REP.	(420) 541 424 611	NORWAY	(47) 67 12 90 20
DENMARK	(45) 7025 2900	POLAND	(48) 22 211 9600
ESTONIA	(372) 651 0370	PORTUGAL	(351) 21 471 1880
FINLAND	(358) 207 513513	ROMANIA	(40) 21 320 5111
FRANCE	(33) 1 6476 1000	SLOVAKIA	(421) 2 444 56725
GERMANY	(49) 6103 4020	SLOVENIA	(386) 73 885 412
GREECE	(30) 210 271 7265	SPAIN	(34) 945 184 100
HUNGARY	(36) 23 511 390	SWEDEN	(46) 8 603 1200
IRELAND	(353) 1 403 9000	SWITZERLAND	(41) 52 396 3131
ITALY	(39) 02 92711	UNITED KINGDOM	(44) 1908 563888

SMC Corporation

URL <http://www.smcworld.com> (Global) <http://www.smc.eu.com> (Europe)

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