

ORIGINAL INSTRUCTIONS

Instruction Manual 4-axis Step Motor Controller EtherNet/IP™ compatible Series JXC93



The intended use of the step motor controller is to control the movement of an electric actuator while connected to the EtherNet/IPTM protocol.

1 Safety Instructions

These safety instructions are intended to prevent hazardous situations and/or equipment damage. These instructions indicate the level of potential hazard with the labels of "Caution," "Warning" or "Danger." They are all important notes for safety and must be followed in addition to International Standards (ISO/IEC)*1), and other safety regulations.

IEC 60204-1: Safety of machinery - Electrical equipment of machines. (Part 1: General requirements)

ISO 10218-1: Robots and robotic devices - Safety requirements for industrial robots - Part 1: Robots.

- Refer to product catalogue, Operation Manual and Handling Precautions for SMC Products for additional information.
- Keep this manual in a safe place for future reference.

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

⚠ Warning

- Always ensure compliance with relevant safety laws and standards.
- All work must be carried out in a safe manner by a qualified person in compliance with applicable national regulations.

2 Specifications

2.1 General specifications

Item	Specifications
Number of axes	4-axis maximum
Compatible motor	Step motor (servo 24 VDC)
Compatible encoder	Incremental A/B phase (800 pulse/rotation)
Power supply	24 VDC +/-10% (motor drive and control).
Current consumption	350 mA maximum (controller) Refer to the actuator specifications for total current consumption.
Serial communication	USB2.0 (full speed 12 Mbps)
Memory	Flash ROM and Eeprom
Lock control	Forced lock release terminal
Cable length	Actuator cable: 20 m max.
Cooling method	Natural air-cooling
Operating temperature	0°C to 40°C (no freezing)
Storage temperature	-10°C to 60°C (no freezing)
Ambient humidity	90% RH or less (no condensation)
Insulation resistance	50 MΩ (500 VDC) between external terminals and case
Weight	1050 g (Direct mounting) 1100 g (DIN rail mounting)

2 Specifications (continued)

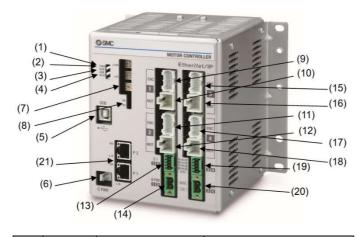
2.2 EtherNet/IP specifications

Item	Specification
Protocol	EtherNet/IP™ (Conformance test version CT12)
Communication speed	10 / 100 Mbps (automatic negotiation)
Communication method	Full duplex / Half duplex (automatic negotiation)
Communication cable	Standard Ethernet cable (STP, CAT5 or higher, 100BASE-TX)
Occupied area	Input 16 byte / Output 16 byte
IP address setting range	Setting by rotary switch: 192.168.1.1 to 254 via DHCP server: Arbitrary address
Vendor ID	7h (SMC Corporation)
Product type	2Bh (Generic Device)
Product code	DCh
EDS setup file	jxc93_v10.eds

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Special products (-X) might have specifications different from those shown in this section. Contact SMC for specific drawings.

3 Name and function of parts



No.	Display	Description	Details
1	PWR	Power supply LED (green)	LED is ON: Power is ON LED is OFF: Power is OFF
2	RUN	Operating LED (green)	LED is ON: Operation by EtherNet/IP. LED is flashing: Operation by USB communication. LED is OFF: Stop.
3	USB	USB LED (green)	USB connected: LED is ON USB not connected: LED is OFF
4	ALM	Alarm LED (red)	LED is ON: Alarm generated. LED is OFF: No alarm
5	USB	Serial communication	Connect to a PC using a USB cable.
6	C PWR	Main control power supply connector (2 pin) Note)	Main control power supply (+)(-)
7	x100 x10 x1	IP address setting switches	Switches to set the 4 th byte of IP address (x1, x10, x100).
8	MS, NS	Communication status LED	LED to display the EtherNet/IP communication status
9	ENC1	Encoder connector (16 pins)	Axis 1: Connect the actuator
10	MOT1	Motor power connector (6 pins)	cable.

3 Name and function of parts (continued)

No.	Display	Description	Details
11	ENC2	Encoder connector (16 pins)	Axis 2: Connect the actuator
12	мот2	Motor power connector (6 pins)	cable.
13	CI 11 2	Motor control power supply connector Note)	Motor control power supply (+), Axis 1 stop (+), Axis 1 unlock (+), Axis 2 stop (+), Axis 2 unlock (+)
14	M PWR	Motor drive power connector Note)	Axis 1, Axis 2 Motor drive power (+), common (-)
15	ENC3	Encoder connector (16 pins)	Axis 3: Connect the actuator
16	мот3	Motor power connector (6 pins)	cable.
17	ENC4	Encoder connector (16 pins)	Axis 4: Connect the actuator
18 MOT4		Motor power connector (6 pins)	cable.
19	CI 3 4	Motor control power supply connector Note)	Motor control power supply (+), Axis 3 stop (+), Axis 3 unlock (+), Axis 4 stop (+), Axis 4 unlock (+)
20			Axis 3, Axis 4 Motor drive power (+), common (-)
21 P1, P2 EtherNet/IP communication connector		communication	Connection for EtherNet cable

4 Installation

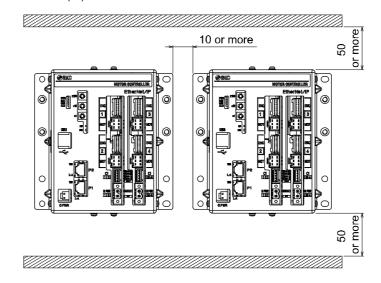
4.1 Installation

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- Do not install the product unless the safety instructions have been read and understood.
- · Design the installation so that the temperature surrounding the

controller is 40°C max. Leave enough space between the controllers so that the operating temperature of the controllers remains within the specification range.

- Mount the controller vertically with 50 mm minimum space on the top and bottom of the controller as shown below.
- Allow 100 mm minimum space between the front of the controller and a door (lid) so that the connectors can be connected and disconnected.

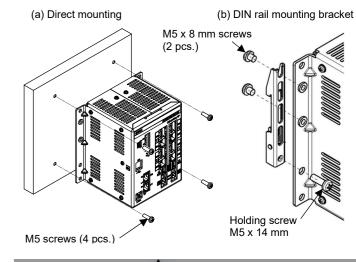


4.2 Mounting

- The controller can be direct mounted using 4 x M5 screws (prepared by the user) or mounted on a DIN rail.
- Secure the DIN rail mounting bracket to the controller using the mounting screws supplied (M5 x 8 mm) in 2 places on each side.
 Recommended torque: 3.0 N.m.

4 Installation (continued)

Then fit the DIN rail mounting bracket holding screw supplied (M5 x 14 mm) in one place on each side. Tighten approximately 2 turns.
 Recommended torque: 0.4 to 0.6 N.m.

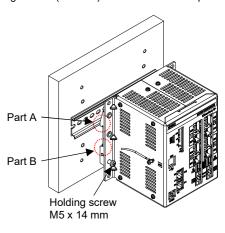


Caution

If the mounting surface for the controller is not flat or is uneven, excessive stress may be applied to the enclosure, which can cause failure. Be sure to mount it on a flat surface.

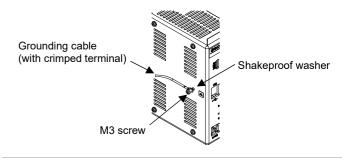
4.3 Mounting on to DIN rail

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 then tighten the holding screws (M5 x 14). Recommended torque: 0.4 to 0.6 N.m.



4.4 Ground connection

- Fit the grounding cable using a crimped terminal between the M3 screw and shakeproof washer as shown below and tighten the screw.
- The cable and crimped terminal are prepared by the user. The controller must be connected to ground to reduce noise.



A Caution

- A dedicated Ground connection must be used. Grounding should be to a D-class ground specification (resistance of 100 Ω maximum).
- The cross-sectional area of the ground cable shall be 2 mm² minimum.
- The Grounding point should be as near as possible to the controller.
 Keep the grounding cable as short as possible.

4 Installation (continued)

4.5 Environment

Warning

- Do not use in an environment where corrosive gases, chemicals, salt water or steam are present.
- Do not use in an explosive atmosphere.
- Do not expose to direct sunlight. Use a suitable protective cover.
- Do not install in a location subject to vibration or impact in excess of the product's specifications.
- Do not mount in a location exposed to radiant heat that would result in temperatures in excess of the product's specifications.
- Avoid mounting the controller near a vibration source, such as a large electromagnetic contactor or circuit breaker on the same panel.
- Do not use in an environment with strong magnetic fields present.

5 Wiring

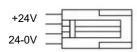
5.1 Wiring

A Caution

- . Do not perform wiring while the power is on.
- · Confirm proper insulation of wiring.
- Do not route wires and cables together with power or high voltage cables.
- Keep wiring as short as possible to prevent interference from electromagnetic noise and surge voltage.
- Do not use an inrush current limited type of power supply for the motor drive and motor control power.
- Do not insert multiple wires into one terminal.

5.2 Main Control Power Connector (C PWR)

- Wire the Main control power supply cable to the power supply plug connector, then insert it into connector C PWR on the controller.
- Use the power cable for main control, SMC part number JXC-C1.



Pin No.	Terminal	Wire colour	Description
1	+24V	Brown	Power supply (+) for main control.
2	24-0V	Blue	Power supply (-) for main control.

Wire specifications

Item	Specifications
Wire size	Stranded wire → AWG20 (0.5mm²)

5.3 Motor Drive Power Connector (M PWR)



Phoenix Contact GmbH Part No. MSTB2,5/2-STF-5,08

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.

5 Wiring (continued)

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

Item	Specifications	
Applicable wire size	Single stranded wire → AWG16 (1.25 mm²) The rated temperature of the insulation coating should be 60°C or more.	
Stripped wire length	\$3.4 max.	

. Insert only the stripped part of the wire into the connector.

5.4 Motor Control Power Connector (CI)



Phoenix Contact GmbH Part No. FK-MC0,5/5-ST-2,5

Pin No.	Terminal	Function	Description
1	C24V	Motor control power supply (+)	Power supply (+) for motor control.
2	EMG1 / EMG3	Stop (+)	Release stop status (+) of Axis 1 or Axis 3 (normal operation by applying 24 V).
3	EMG2 / EMG4	Stop (+)	Release stop status (+) of Axis 2 or Axis 4 (normal operation by applying 24 V).
4	LKRLS1 / LKRLS3	Unlock (+)	Release lock status (+) of Axis 1 or Axis 3.
5	LKRLS2 / LKRLS4	Unlock (+)	Release lock status (+) of Axis 2 or Axis 4.

Prepare the electrical wiring according to the following specifications.

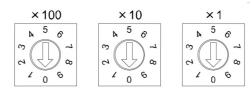
Item	Specifications		
Applicable wire size	Single stranded wire → AWG20 (0.5 mm²) The rated temperature of the insulation coating should be 60°C or more.		
Stripped wire length	φ2.0 max. 8 mm		

• Insert only the stripped part of the wire into the connector.

6 Setting

6.1 Switch Setting

- Switch settings should be carried out with the power OFF.
- The switches should be set using a small flat blade screwdriver.



IP address 192.168.1. ***

Setting			Description
x100	x10	x1	Description
0	0	0	Remote Control (DHCP) *1
0	0	1	192.168.1.1 (default)
0	0	2	192.168.1.2
:	:	:	:
2	5	4	192.168.1.254
2	5	5	DHCP mode *2
2	5	6	
:	:	:	Not used
9	9	9	

Note *1) The mode to set IP address by DHCP server.

When "BOOTP/DHCP Server" (from Rockwell Automation) is used for IP address setting, it is possible to choose whether or not to obtain an IP address when power is supplied to the controller.

Enable DHCP: Controller acquires an IP address from the DHCP server when power is supplied to the controller. The controller deletes the IP address information when the power supply is disconnected.

Disable DHCP: Controller does not acquire an IP address from the DHCP server when power is supplied to the controller. When the power supply is disconnected, the controller holds the IP address when "Disable DHCP" setting is selected.

Note *2) The mode to set IP address by DHCP server.

The controller acquires an IP address from the DHCP server when power is supplied to the controller after setting the IP address. The controller deletes the IP address information when the power is disconnected.

6.2 Configuration

• An EDS file is required to configure the controller.

Furthermore, icons are necessary for the display icon of the controller on the configurator.

The latest EDS and icon file can be downloaded from the SMC website (URL: https://www.smcworld.com).

7 How to Order

Refer to the operation manual or catalogue on the SMC website (URL: https://www.smcworld.com) for the How to Order information.

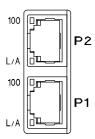
8 Outline Dimensions (mm)

Refer to the operation manual or catalogue on the SMC website (URL: https://www.smcworld.com) for outline dimensions.

9 LED Display

Refer to the table below for the LED status.





LED	Details		
PWR	Power supply status	OFF	Power is supplied
RUN	Operation status	Green LED ON	Operating
		Green LED	Operating using the setting
		flashing	software
		OFF	Not operating
USB	USB status	Green LED ON	USB connected
		OFF	USB not connected
ALM	Alarm status	Red LED ON	Alarm generated
		OFF	No alarm generated
NS	EtherNet/IP communication status	OFF	Main control power supply is OFF or IP address is not set.
		Green LED ON	Connection is established.
		Green LED flashing	Connection is not established.
		Red LED flashing	Connection time out
		Red LED ON	IP duplicated
MS	EtherNet/IP controller status	OFF	Main control power supply is OFF
		Green LED ON	Operating normally
		Green LED flashing	Setting error
		Red LED flashing	Recoverable error
		Red LED ON	Unrecoverable error
P1 100	EtherNet/IP communication speed	OFF	10 Mbps
		Orange LED ON	100 Mbps
P1 L/A	Data transmission status	OFF	Communication is not established. No data transmission.
		Green LED ON	Communication established. No data transmission.
		Green LED flashing	Communication established. Data transmission in progress.
P2	EtherNet/IP	OFF	10 Mbps
100	communicat- ion speed	Orange LED ON	100 Mbps
P2 L/A	Data transmission status	OFF	Communication is not established. No data transmission.
		Green LED ON	Communication established. No data transmission.
		Green LED flashing	Communication established. Data transmission in progress.

10 Maintenance

10.1 General Maintenance

A Caution

- Not following proper maintenance procedures could cause the product to malfunction and lead to equipment damage.
- Before performing maintenance, turn off the power supply. Check the voltage with a tester 5 minutes after the power supply is turned OFF.
- If any electrical connections are disturbed during maintenance, ensure they are reconnected correctly and safety checks are carried out as required to ensure continued compliance with applicable national
- Do not make any modification to the product.
- Do not disassemble the product, unless required by installation or maintenance instructions.

⚠ Caution

- Maintenance should be performed according to the procedure indicated in the Operation Manual.
- When equipment is serviced, first confirm that measures are in place to prevent dropping of work pieces and run-away of equipment, etc, then cut the power supply to the system. When machinery is restarted, check that operation is normal with actuators in the correct position.

Marning

- · Perform maintenance checks periodically.
- Confirm wiring and screws are not loose. Loose screws or wires may cause unexpected malfunction.
- Conduct an appropriate functional inspection and test after completing maintenance. In case of any abnormalities (if the actuator does not move, etc.), stop the operation of the system. Otherwise, an unexpected malfunction may occur and it will become impossible to ensure safety. Operate an emergency stop instruction to confirm safety.
- Do not put anything conductive or flammable inside of the controller.
- Ensure sufficient space around the controller for maintenance.

11 Limitations of Use

11.1 Limited warranty and Disclaimer/Compliance Requirements Refer to Handling Precautions for SMC Products.

12 Product disposal

This product shall not be disposed of as municipal waste. Check your local regulations and guidelines to dispose of this product correctly, in order to reduce the impact on human health and the environment.

13 Contacts

Refer to www.smcworld.com or www.smc.eu for your local distributor /

SMC Corporation

URL: https://www.smc.eu (Europe) SMC Corporation, Akihabara UDX15F, 4-14-1, Sotokanda, Chiyoda-ku, Tokyo 101

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