JXCE1-TF2Z196EN

ORIGINAL INSTRUCTIONS

Instruction Manual
Step Motor Controller – EtherCAT
(24 VDC Servo)
Series JXCE1##-#

The intended use of the step motor controller is to control the movement of an electrical actuator whilst connected to the EtherCAT communication 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**	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.

⚠ 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
Compatible motor	Step motor (servo 24 VDC)
Power supply	Power supply voltage: 24 VDC +/-10% (motor drive control, stop, lock brake release).
Current consumption	200 mA or less (controller) Refer to the actuator specifications for total power consumption.
Compatible encoder	Incremental A/B phase (resolution: 800 pulses / rotation)
Memory	EEprom
Locking	Unlocking terminal (applicable to non-exitation magnetizing lock)
Cable length	Actuator cable: 20 m maximum
Cooling method	Air-cooling type
Operating temperature	0°C to 40°C (version S1.*/S2.*/V1.*/V2.*) 0°C to 55°C (version S3.*/V3.* or later) No freezing.
Storage temperature	-10ºC to 60ºC (no freezing)
Operating humidity	90% RH or less (No condensation)
Insulation resistance	50 MΩ (500 VDC) between the external terminals and case
Weight	210 g (Direct mounting type) 230 g (DIN rail mounting type)

2 Specifications (continued)

2.2 EtherCAT communication specifications

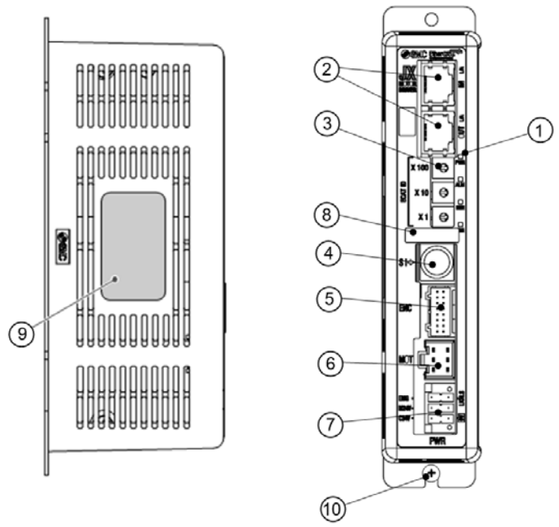
Item	Specifications
Protocol	EtherCAT (Conformance Test Record V1.2.6)
Communication speed	100 Mbps
Communication method	Full duplex / Half duplex (automatic negotiation)
Communication cable	Standard Ethernet cable (STP, CAT5 or higher, 100BASE-TX)
Occupied area	Input 20 byte / Output 36 byte
Connectable nodes	65,535 nodes maximum
Vendor ID	0114h (276)
Network topology	Refer to the EtherCAT topology
Setup file	ESI file: SMC JXCE1_V10.xml

The ESI set up file can be downloaded from the SMC website (URL: https://www.smcworld.com).

⚠ Warning

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

3 Name and function of individual parts



3 Name and function of individual parts (continued)

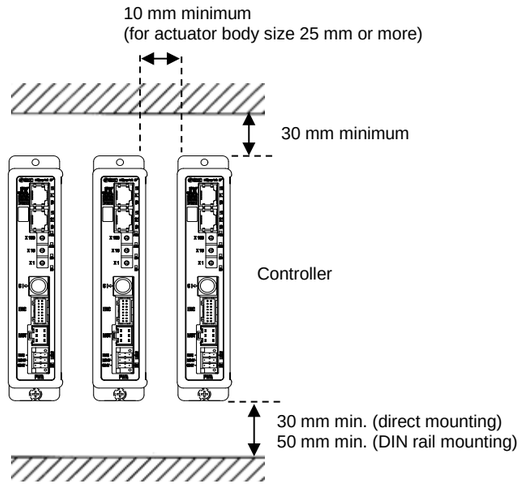
No.	Name	Description
1	Display	LED's to indicate the controller status.
2	Communication connectors (IN / OUT)	Connect to the EtherCAT communication network.
3	EtherCAT ID switch	Switches to set the slave EtherCAT communication ID (0 to 255) using X1, X10 and X100.
4	Serial I/O connector (8 pin) SI	Connector for the teaching box (LEC-T1) or the controller communication cable (JXC-W2A-C).
5	Encoder connector (16 pin) ENC	Connector for actuator cable.
6	Motor drive connector (6 pin) MOT	
7	Power supply connector (6 pin) PWR	Connector for controller power supply (24 VDC) using the power supply plug. Control power (+), Stop signal (+), Motor power (+), Lock release (+), Common power (-)
8	Applicable actuator model number label	Label indicating the electric actuator part number which can be connected to the controller.
9	Controller part number label	Label indicating the controller part number.
10	FE	Functional Ground (When the controller is mounted, tighten screws and connect the grounding cable).

4 Installation

4.1 Installation

⚠ Warning

- 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 within the specified operating temperature. Leave enough space between the controllers so that the operating temperature of the controllers remains within the specification range.
- Mount the controller vertically with 30 mm minimum space on the top and bottom of the controller as shown below.
- Allow 60 mm minimum space between the front of the controller and a door (lid) so that the connectors can be connected and disconnected.



4 Installation (continued)

4.2 Mounting

- The controller can be direct mounted (model JXCE17#) using screws or mounted on a DIN rail (model JXCE18#).
- When using DIN rail mounting, hook the controller on the DIN rail and press the lever down to lock it.

⚠ 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 on a flat surface.

4.3 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.

4.4 Wiring

⚠ 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 controller.
- Do not connect multiple wires to one connector terminal.

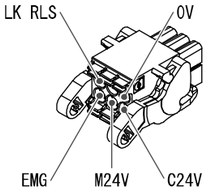
Power Supply Connector

Wire the power supply cable to the power supply plug connector, then insert it into connector PWR on the controller.

- Use special screwdriver (Phoenix Contact No. SZS0.4×2.0) to open / close lever and insert the wire into the connector terminal.

Power supply connector.
SMC Part No. JXC-CPW.

Phoenix Contact Part No:
DFMC1,5/3-ST-LR

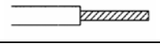


Pin No.	Terminal	Function	Description
1	C24V	Power supply (+)	Positive control power.
2	M24V	Motor power (+)	Positive power for the actuator motor supplied via the controller.
3	EMG	Stop (+)	Positive power for emergency stop signal
4	0V	Common power (-)	Negative common power for M24V, C24V, EMG and LK RLS.
5	-	NC	N/A
6	LK RLS	Unlocking (+)	Positive power for lock release.

4 Installation (continued)

Power Supply Wire specifications

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

Item	Specifications
Applicable wire size	• Single stranded wire AWG20 (0.5 mm^2) • Rated temperature of insulation should be 60ºC or more. • The OD should be ø2.5 mm or less.
Stripped wire length	 8 mm

4.5 Ground connection

- Place a ground cable with crimped terminal under one of the M4 mounting screws with a shakeproof washer and tighten the screw.

Caution

The M4 screw, cable with crimped terminal and shakeproof washer must be prepared by the user.

The controller must be connected to Ground to reduce noise. If higher noise resistance is required, ground the 0 V (signal ground). When grounding the 0 V, avoid flowing noise from ground to 0 V.

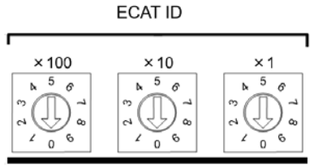
- A dedicated Ground connection must be used. Grounding should be to a D-class ground (ground resistance of 100 Ω maximum).
- The cross-sectional area of the ground cable shall be 2 mm^2 minimum.
- The Grounding point should be as near as possible to the controller. Keep the grounding cable as short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

5 Setting

5.1 Switch setting

- Turn off the power supply while setting the switch.
- The rotary switch should be set with a small flat blade screwdriver.

The EtherCAT ID of the controller is set using the rotary switches.
When the switches are set to “000”, the EtherCAT ID of the controller can be set by the EtherCAT master device.
To set the EtherCAT ID through the EtherCAT master device, refer to the manual of the EtherCAT master device.
(The initial value of the EtherCAT ID is “0”, when “000” is set by the rotary switches).



EtherCAT ID setting

Switch setting			EtherCAT ID
x100	x10	x1	
0	0	0	Value that allows setting by EtherCAT master device (Initial value: “0”)
0	0	1	1 (Default)
0	0	2	2
0	:	:	:
0	6	4	64
:	:	:	:
9	9	9	999

Hardware Configuration

ESI file (XML file) is required to configure the controller.
ESI file (XML file) can be downloaded from the URL given below.
The ESI set up file can be downloaded from the SMC website (URL: https://www.smcworld.com).

6 LED Display

Refer to the table below for details of the LED status.

LED		Description
PWR	OFF	Power is not supplied
	Green LED is ON	Power is supplied
ALM	OFF	Normal operation
	Red LED is ON	Alarm generated
RUN	OFF	INIT state
	Green LED is flashing	Pre-Operational state
	Green LED is single flashing	Safe-Operational state
	Green LED is ON	Operational state
ERR	OFF	No error in EtherCAT communication
	Red LED is flashing	Error in the setting of EtherCAT communication
	Red LED is double flashing	Error in the setting of EtherCAT communication (application watch dog timeout).
L/A 1	OFF	“IN” port: No Link, No Activity
	Green LED is ON	“IN” port: Link, No Activity
	Green Led is flashing	“IN” port: Link, Activity
L/A 2	OFF	“OUT” port: No Link, No Activity
	Green LED is ON	“OUT” port: Link, No Activity
	Green Led is flashing	“OUT” port: Link, Activity

7 How to Order

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

8 Outline Dimensions (mm)

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

9 Maintenance

9.1 General Maintenance

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 regulations.
- 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.

Warning

- 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.

10 Limitations of Use

10.1 Limited warranty and Disclaimer/Compliance Requirements

Refer to Handling Precautions for SMC Products.

11 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.

12 Contacts

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

SMC Corporation

URL: https://www.smcworld.com (Global) https://www.smc.eu (Europe)
SMC Corporation, 4-14-1, Sotokanda, Chiyoda-ku, Tokyo 101-0021, Japan

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