

Step Motor Controller



New
EtherCAT[®] Type



New
PROFINET[®] Type



New
DeviceNet[™] Type



EtherNet/IP[™] Type



◎ **Two types of operation command**

Step no. defined operation: Operate using the preset step data in the controller.

Numerical data defined operation: The actuator operates using values such as position and speed from the PLC.

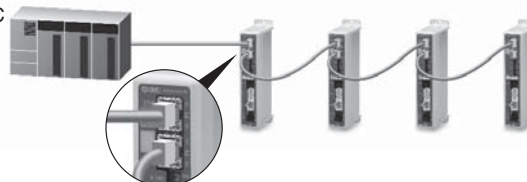
◎ **Numerical monitoring available**

Numerical information, such as the current speed, current position, and alarm codes, can be monitored on the PLC.

◎ **Transition wiring of communication cables**

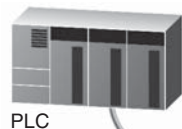
Two communication ports are provided.

* For the DeviceNet[™] type, transition wiring is possible using a branch connector.



Application Examples

Both air and electric systems can be established under the same protocol.



PLC

Communication protocol

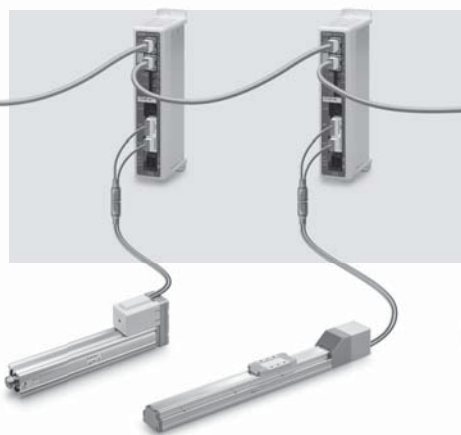
EtherCAT[®]

EtherNet/IP[™]

PROFINET[®]

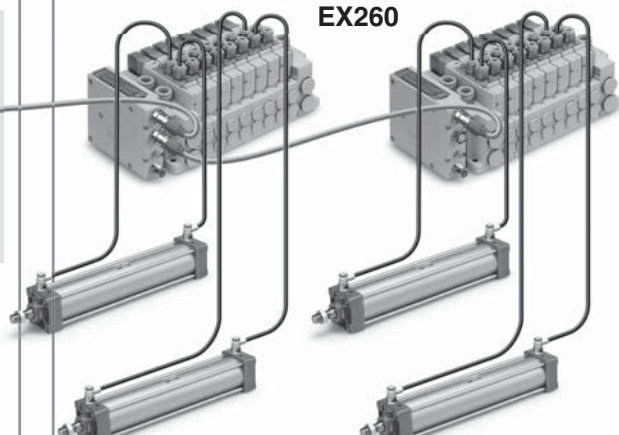
DeviceNet[™]

Electric Actuators



Air Cylinders

EX260



<Applicable electric actuators>



Electric actuator/
Slider type
LEF Series



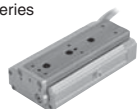
Electric actuator/
Low profile slider type
LEM Series



Electric actuator/
Guide rod slider
LEL Series



Electric actuator/
Rod type
LEY/LEYG Series



Electric slide table
LES/LESH Series



Electric actuator/
Miniature type
LEPY/LEPS Series



Electric gripper
LEH Series



Electric actuator/
Rotary table
LER Series

JXCE1/91/P1/D1 Series



15-EU667-UK

JXCE1/91/P1/D1 Series

System Construction

● Electric actuators

- LEY/LEYG Series
- LEF Series
- LES/LESH Series
- LER Series
- LEL Series
- LEPY/LEPS Series
- LEH Series
- LEM Series

● Actuator cable

Standard cable	Robotic cable
LE-CP-□-S	LE-CP-□

Provided by customer

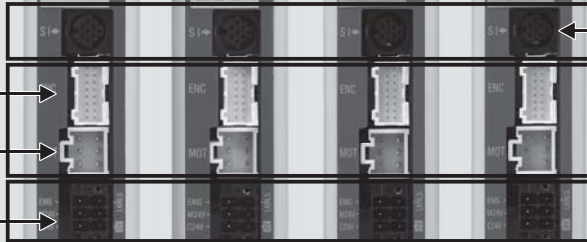
Power supply for controller
24 V DC

● Power supply plug P.6
(Accessory)

Provided by customer Provided by customer Provided by customer Provided by customer



EtherCAT EtherNet/IP PROFINET DeviceNet



● Communication plug connector for DeviceNet™ P.6

Straight type	JXC-CD-S
T-branch type	JXC-CD-T

To SI

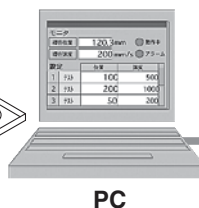
Options

- Teaching box
(With 3 m cable)
LEC-T1-3JG□



- Controller setting kit

Controller setting kit
(Communication cable, conversion unit,
and USB cable are included.)
LEC-W2



Communication cable ●
(3 m)

● USB cable
(A-mini B type)
(0.3 m)

- Conversion cable*1 P.6

P5062-5
(0.3 m)

The conversion cable can be used for connecting this controller to the optional teaching box [LEC-T1] or the controller setting kit [LEC-W2] offered with the LEC series.

*1 To connect the teaching box or LEC controller setting kit communication cable to the controller, a conversion cable is required.

Step Motor Controller

JXCE1/91/P1/D1 Series   



How to Order

Actuator + Controller

LEFS16B-100 - R1 CD17T

Actuator type

Refer to "How to Order" in the actuator catalogue available at www.smc.eu.
For compatible actuators, refer to the table below. Example: LEFS16B-100B-R1C917

Compatible actuators	
Electric Actuator/Rod LEY Series	Refer to the Web Catalogue.
Electric Actuator/Guide Rod LEYG Series	
Electric Actuator/Slider LEF Series	
Electric Slide Table LES/LESH Series	
Electric Rotary Table LER Series	
Electric Actuator/Guide Rod Slider LEL Series	
Electric Actuator/Miniature LEPY/LEPS Series	
Electric Gripper LEH Series	
Electric Actuator/Low Profile Slider LEM Series	

* Only the step motor type is applicable.

Caution

[CE-compliant products]

EMC compliance was tested by combining the electric actuator LE series and the JXCE1/91/P1/D1 series.

The EMC depends on the configuration of the customer's control panel and the relationship with other electrical equipment and wiring. Therefore, compliance with the EMC directive cannot be certified for SMC components incorporated into the customer's equipment under actual operating conditions. As a result, it is necessary for the customer to verify compliance with the EMC directive for the machinery and equipment as a whole.

Actuator cable type/length

—	Without cable
S1	Standard cable 1.5 m
S3	Standard cable 3 m
S5	Standard cable 5 m
R1	Robotic cable 1.5 m
R3	Robotic cable 3 m
R5	Robotic cable 5 m
R8	Robotic cable 8 m*1
RA	Robotic cable 10 m*1
RB	Robotic cable 15 m*1
RC	Robotic cable 20 m*1

*1 Produced upon receipt of order (Robotic cable only)

* The standard cable should only be used on fixed parts. For use on moving parts, select the robotic cable.

Controller

—	Without controller
C□1□□	With controller

CD17T

Communication protocol

E	EtherCAT®
9	EtherNet/IP™
P	PROFINET
D	DeviceNet™

For single axis

Mounting

7	Screw mounting
8*1	DIN rail

*1 DIN rail is not included. It must be ordered separately. (Page 6)

Communication plug connector for DeviceNet™

—	Without plug connector
S	Straight type
T	T-branch type

* Select "—" for anything other than DeviceNet™.

When selecting an electric actuator, refer to the model selection chart of each actuator. Also, for the "Speed-Work Load" graph of the actuator, refer to the LECPMJ section on the model selection page of the electric actuators **Web Catalogue**.

Controller

JXC D17T - LEFS16B-100

Precautions for blank controllers (JXC□1□□-BC)

A blank controller is a controller to which the customer can write the data of the actuator it is to be combined and used with. Use the dedicated software (JXC-BCW) for data writing.

• Please download the dedicated software (JXC-BCW) via our website.

• Order the controller setting kit (LEC-W2) separately to use this software.

SMC website
<http://www.smcworld.com>

Communication protocol

E	EtherCAT®
9	EtherNet/IP™
P	PROFINET
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For single axis

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7	Screw mounting
8*1	DIN rail

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Actuator part number

Without cable specifications and actuator options
Example: Enter "LEFS16B-100" for the LEFS16B-100B-S1□□.

BC Blank controller*1

*1 Requires dedicated software (JXC-BCW).

Communication plug connector for DeviceNet™

—	Without plug connector
S	Straight type
T	T-branch type

* Select "—" for anything other than DeviceNet™.

When selecting an electric actuator, refer to the model selection chart of each actuator. Also, for the "Speed-Work Load" graph of the actuator, refer to the LECPMJ section on the model selection page of the electric actuators **Web Catalogue**.

JXCE1/91/P1/D1 Series

Specifications

Model		JXCE1	JXC91	JXCP1	JXCD1	
Network		EtherCAT®	EtherNet/IP™	PROFINET	DeviceNet™	
Compatible motor		Step motor (Servo/24 V DC)				
Power supply		Power voltage: 24 V DC ±10 %				
Current consumption (Controller)		200 mA or less	130 mA or less	200 mA or less	100 mA or less	
Compatible encoder		Incremental A/B phase (800 pulse/rotation)				
Communication specifications	Applicable system	Protocol	EtherCAT®*2	EtherNet/IP™*2	PROFINET*2	DeviceNet™
		Version*1	Conformance Test Record V.1.1.2.6	Volume 1 (Edition 3.14) Volume 2 (Edition 1.15)	Specification Version 2.32	Volume 1 (Edition 3.14) Volume 3 (Edition 1.13)
	Communication speed	100 Mbps*2	10/100 Mbps*2 (Automatic negotiation)	100 Mbps*2	125/250/500 kbps	
	Configuration file*3	ESI file	EDS file	GSDML file	EDS file	
	I/O occupation area	Input 20 bytes Output 36 bytes	Input 36 bytes Output 36 bytes	Input 36 bytes Output 36 bytes	Input 4, 10, 20 bytes Output 4, 12, 20, 36 bytes	
Terminating resistor		Not included				
Memory		EEPROM				
LED indicator		PWR, RUN, ALM, ERR	PWR, ALM, MS, NS	PWR, ALM, SF, BF	PWR, ALM, MS, NS	
Cable length [m]		Actuator cable: 20 m or less				
Cooling system		Natural air cooling				
Operating temperature range [°C]		0 to 40 (No freezing)				
Operating humidity range [%RH]		90 or less (No condensation)				
Insulation resistance [MΩ]		Between all external terminals and the case 50 (500 V DC)				
Weight [g]		220 (Screw mounting) 240 (DIN rail mounting)	210 (Screw mounting) 230 (DIN rail mounting)	220 (Screw mounting) 240 (DIN rail mounting)	210 (Screw mounting) 230 (DIN rail mounting)	

*1 Please note that versions are subject to change.

*2 Use a shielded communication cable with CAT5 or higher for the PROFINET, EtherNet/IP™, and EtherCAT®.

*3 The files can be downloaded from the SMC website: <http://www.smc.eu>

■Trademark

EtherNet/IP™ is a trademark of ODVA.

DeviceNet™ is a trademark of ODVA.

EtherCAT® is registered trademark and patented technology, licensed by Beckhoff Automation GmbH, Germany.

Example of Operation Command

In addition to the step data input of 64 points maximum in each communication protocol, the changing of each parameter can be performed in real time in the numerical data defined operation.

<Application example> Movement between 2 points

No.	Movement mode	Speed	Position	Acceleration	Deceleration	Pushing force	Trigger LV	Pushing speed	Moving force	Area 1	Area 2	In position
0	1: Absolute	100	10	3000	3000	0	0	0	100	0	0	0.50
1	1: Absolute	100	100	3000	3000	0	0	0	100	0	0	0.50

<Step No. defined operation>

Sequence 1: Servo ON instruction

Sequence 2: Instruction to return to origin

Sequence 3: Specify step data No. 0 to input the DRIVE signal.

Sequence 4: Specify step data No. 1 after the DRIVE signal has been temporarily turned OFF to input the DRIVE signal.

<Numerical data defined operation>

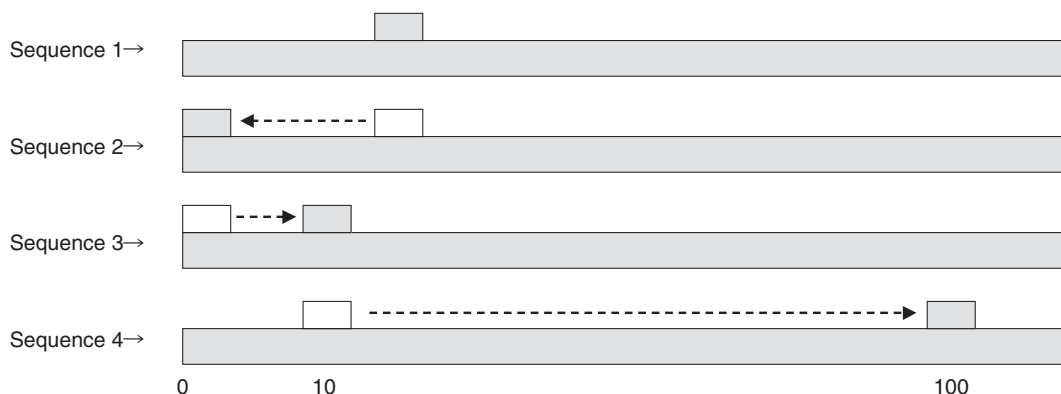
Sequence 1: Servo ON instruction

Sequence 2: Instruction to return to origin

Sequence 3: Specify step data No. 0 and turn ON the input instructions flag (position). Input 10 in the target position. Subsequently the start flag turns ON.

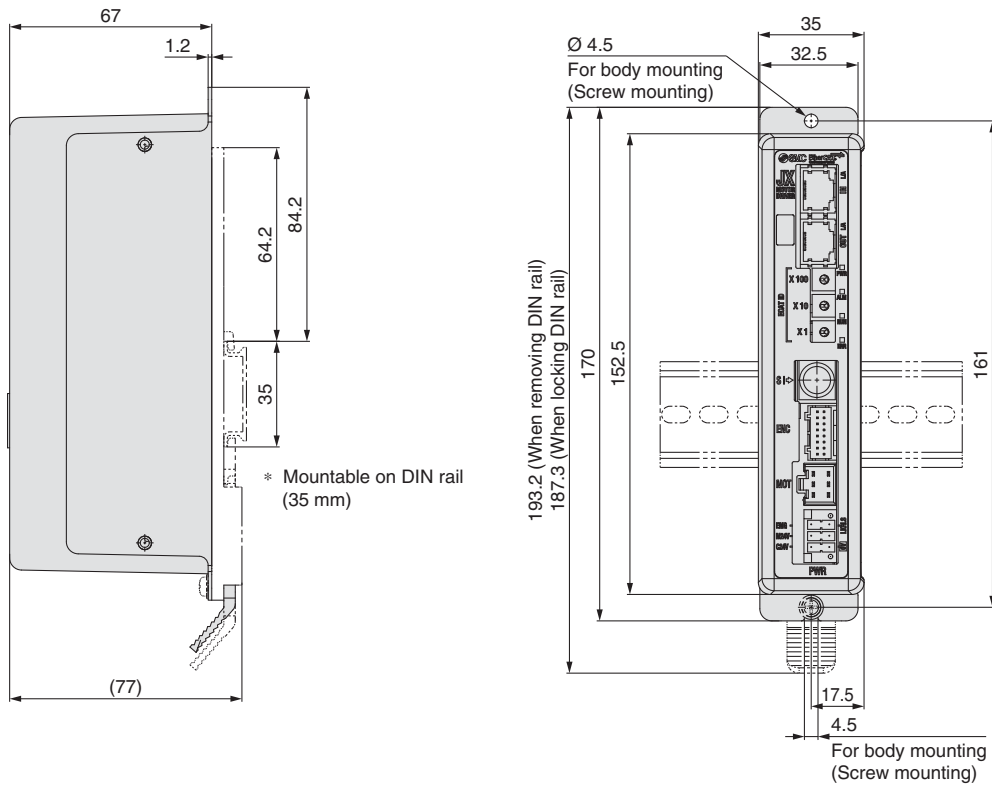
Sequence 4: Turn ON step data No. 0 and the input instructions flag (position) to change the target position to 100 while the start flag is ON.

The same operation can be performed with any operation command.

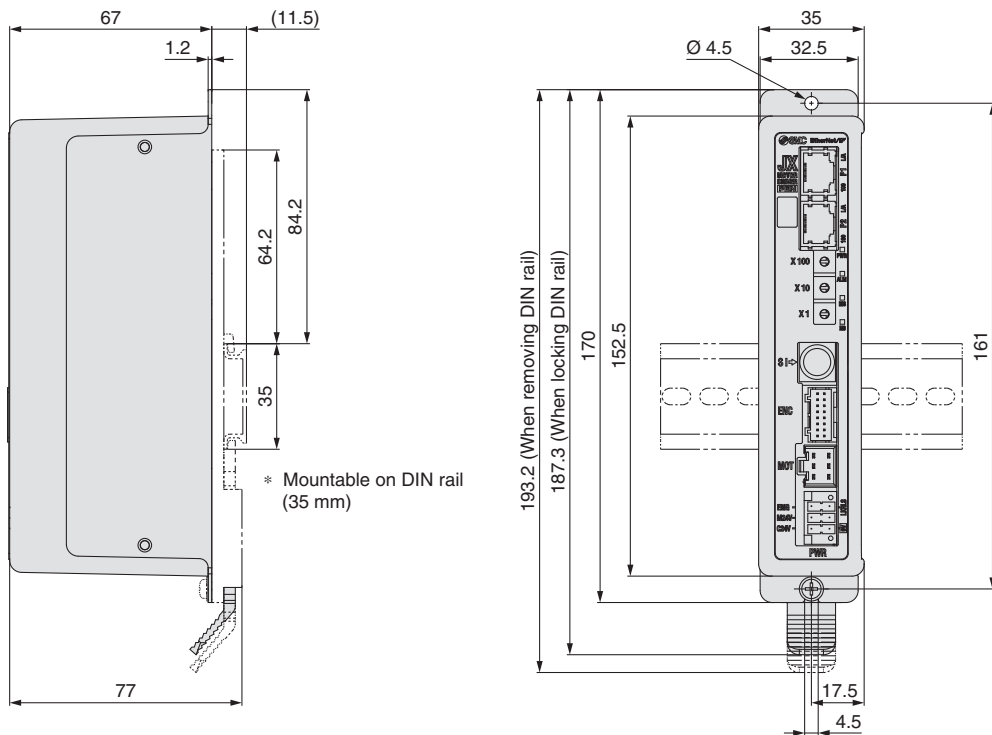


Dimensions

JXCE1



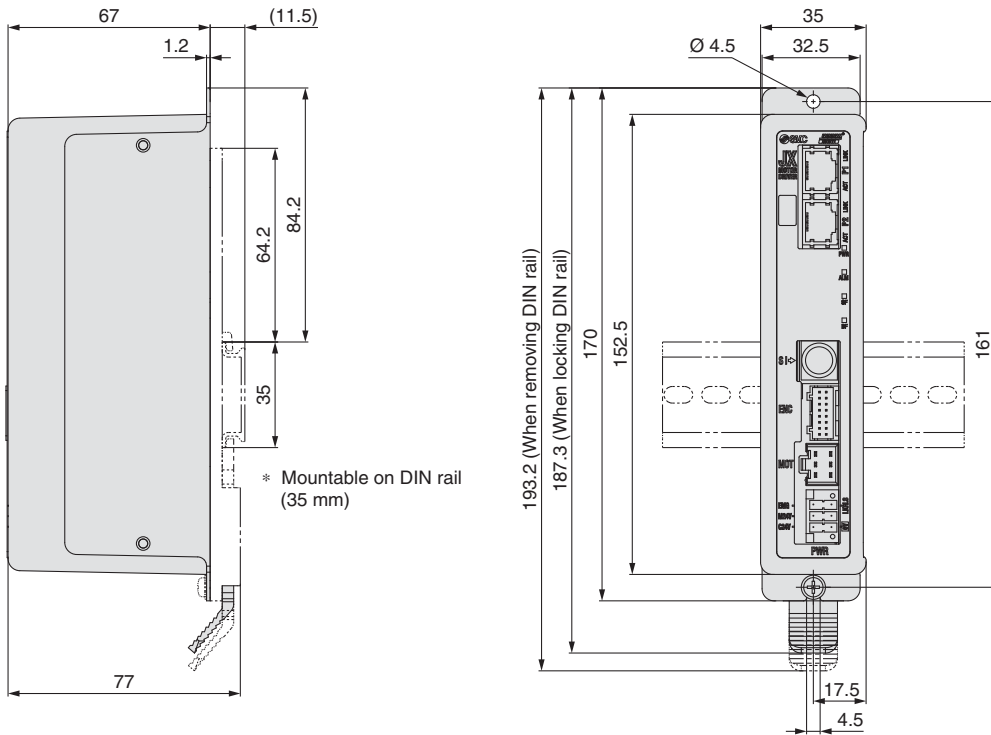
JXC91



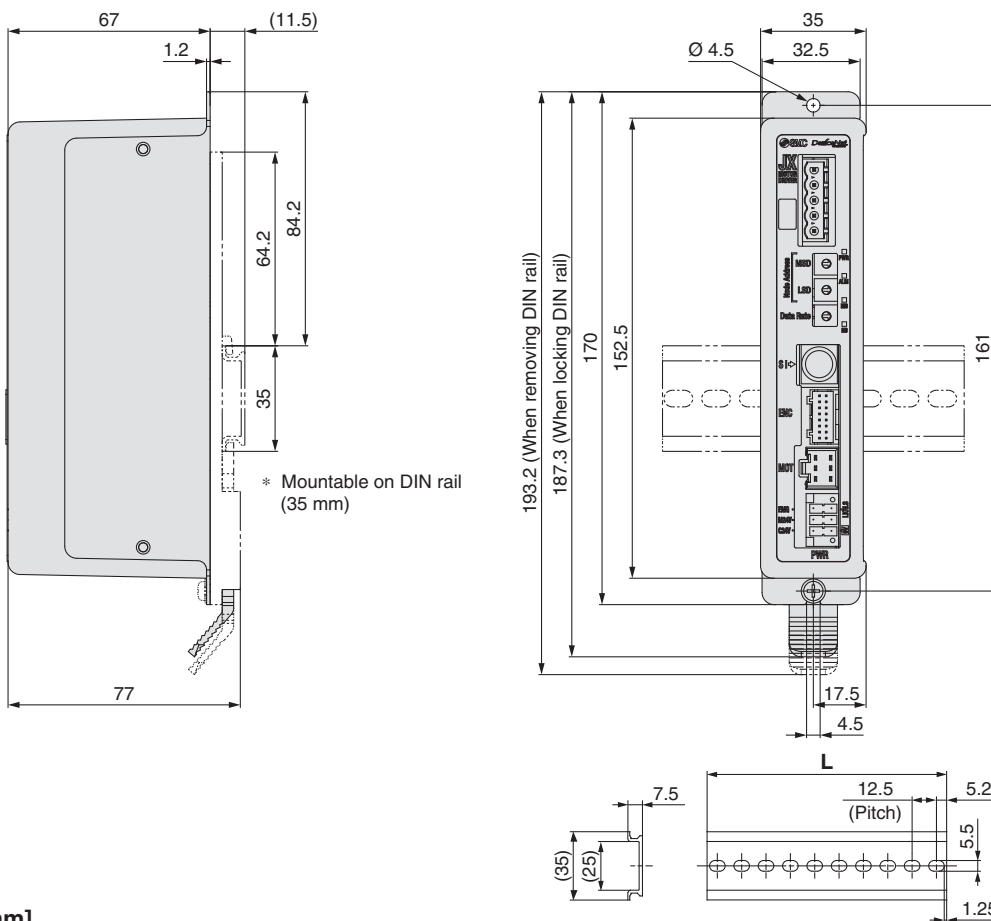
JXCE1/91/P1/D1 Series

Dimensions

JXCP1



JXCD1



L Dimensions [mm]

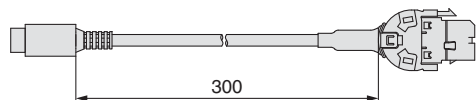
No.	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20
L	23	35.5	48	60.5	73	85.5	98	110.5	123	135.5	148	160.5	173	185.5	198	210.5	223	235.5	248	260.5
No.	21	22	23	24	25	26	27	28	29	30	31	32	33	34	35	36	37	38	39	40
L	273	285.5	298	310.5	323	335.5	348	360.5	373	385.5	398	410.5	423	435.5	448	460.5	473	485.5	498	510.5

Options

• DIN rail AXT100-DR-□

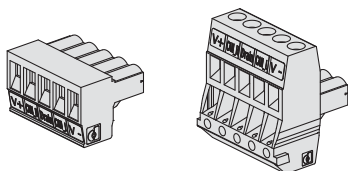
* For □, enter a number from the No. line in the table. (Page 5)
Refer to the dimension drawings (Page 5) for the mounting dimensions.

• Conversion cable P5062-5 (Cable length: 0.3 m)



• Communication plug connector for DeviceNet™

Straight type **T-branch type**
JXC-CD-S **JXC-CD-T**



Communication plug connector for DeviceNet™

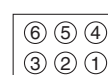
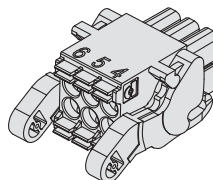
Terminal name	Details
V+	Power supply (+) for DeviceNet™
CAN_H	Communication wire (High)
Drain	Grounding wire/Shielded wire
CAN_L	Communication wire (Low)
V-	Power supply (-) for DeviceNet™

• DIN rail mounting adapter **LEC-3-D0 (with 2 mounting screws)**

This should be used when a DIN rail mounting adapter is mounted onto a screw mounting type controller afterwards.

• Power supply plug JXC-CPW

* The power supply plug is an accessory.



- ① C24V ④ 0V
- ② M24V ⑤ N.C.
- ③ EMG ⑥ LK RLS

Power supply plug

Terminal name	Function	Details
0V	Common supply (-)	M24V terminal/C24V terminal/EMG terminal/LK RLS terminal are common (-).
M24V	Motor power supply (+)	Motor power supply (+) of the controller
C24V	Control power supply (+)	Control power supply (+) of the controller
EMG	Stop (+)	Connection terminal of the external stop circuit
LK RLS	Lock release (+)	Connection terminal of the lock release switch



Series JXCE1/91/P1/D1 Controller and Peripheral Devices/ Specific Product Precautions 1

Be sure to read this before handling. For Safety Instructions and Electric Actuator Precautions, refer to “Handling Precautions for SMC Products” and the Operation Manual on the SMC website, <http://www.smc.eu>

Design/Selection

Warning

1. Use the specified voltage.

If the applied voltage is higher than the specified voltage, malfunction and damage to the controller may result. If the applied voltage is lower than the specified voltage, there is a possibility that the load cannot be moved due to internal voltage drop. Check the operating voltage prior to start.

2. Do not use the products outside the specifications.

Otherwise, fire, malfunction or damage to the product can result. Check the specifications prior to use.

3. Install an emergency stop circuit.

Install an emergency stop outside the enclosure in easy reach to the operator so that the operator can stop the system operation immediately and intercept the power supply.

4. To prevent danger and damage due to a breakdown or malfunction of these products, a backup system should be arranged in advance by using a multiple-layered structure or by making a fail-safe equipment design, etc.

5. If there is a risk of fire or personal injury due to abnormal heat generation, sparking, smoke generated by the product, etc., cut off the power supply from this product and the system immediately.

Handling

Warning

1. Never touch the inside of the controller and its peripheral devices.

Otherwise, electric shock or failure can result.

2. Do not operate or set up this equipment with wet hands.

Otherwise, electric shock can result.

3. Do not use a product that is damaged or missing any components.

Electric shock, fire or injury can result.

4. Use only the specified combination between the electric actuator and controller.

It may cause damage to the actuator or to the controller.

5. Be careful not to touch, get caught or hit by the workpiece while the actuator is moving.

An injury can result.

6. Do not connect the power supply or power up the product until it is confirmed that the workpiece can be moved safely within the area that can be reached by the workpiece.

Otherwise, the movement of the workpiece may cause an accident.

7. Do not touch the product when it is energised and for some time after the power has been disconnected, as it is very hot.

Otherwise, it may cause burns due to the high temperature.

Handling

Warning

8. Check the voltage using a tester at least 5 minutes after power-off when performing installation, wiring and maintenance.

Otherwise, electric shock, fire or injury can result.

9. Static electricity may cause a malfunction or damage the controller. Do not touch the controller while power is supplied to it.

Take sufficient safety measures to eliminate static electricity when it is necessary to touch the controller for maintenance.

10. Do not use the products in an area where they could be exposed to dust, metallic powder, machining chips or splashes of water, oil or chemicals.

Otherwise, a failure or malfunction can result.

11. Do not use the products in a magnetic field.

Otherwise, a malfunction or failure can result.

12. Do not use the products in an environment where flammable, explosive or corrosive gases, liquids or other substances are present.

Otherwise, fire, explosion or corrosion can result.

13. Avoid heat radiation from strong heat sources, such as direct sunlight or a hot furnace.

Otherwise, it will cause a failure to the controller or its peripheral devices.

14. Do not use the products in an environment with cyclic temperature changes.

Otherwise, it will cause a failure to the controller or its peripheral devices.

15. Do not use the products in an environment where surges are generated.

Devices (solenoid type lifters, high frequency induction furnaces, motors, etc.) that generate a large amount of surge around the product may lead to deterioration or damage to the internal circuits of the products. Avoid supplies of surge generation and crossed lines.

16. Do not install the products in a place subject to vibration and impact.

Otherwise, a malfunction or failure can result.

17. When a surge generating load such as a relay or solenoid valve is directly driven, use a product that incorporates a surge absorbing element.

18. The power supplies should be separated between the controller power and the I/O signal power, and both power supplies must not be of “inrush current limited” type.

If the power supply is of “inrush current limited” type, a voltage drop may occur during the acceleration or deceleration of the actuator.



Series JXCE1/91/P1/D1 Controller and Peripheral Devices/ Specific Product Precautions 2

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Mounting

Warning

1. **Install the controller and its peripheral devices on fireproof material.**

Direct installation on or near flammable material may cause fire.

2. **Do not install these products in a place subject to vibration and impact.**

Otherwise, a malfunction or failure can result.

3. **Do not mount the controller and its peripheral devices on the same base together with a large-sized electromagnetic contactor or no-fuse breaker that generate vibration. Mount them on different base plates, or keep the controller and its peripheral devices away from such vibration supplies.**

4. **Install the controller and its peripheral devices on a flat surface.**

If the mounting surface is not flat or uneven, excessive force may be applied to the housing and other parts resulting in a malfunction.

5. **Take measure so that the operating temperature of the controller and its peripheral devices are within the range of the specifications. Also, the controller should be installed with 50 mm or larger spaces between each side of it and the other structures or components.**

Otherwise, it may cause the controller and its peripheral devices to fail and can result in a fire.

Power Supply

Warning

1. **Use a power supply with low noise between lines and between power and ground.**

In cases where noise is high, use an isolation transformer.

2. **Take appropriate measures to prevent surges from lightning. Ground the surge absorber for lightning separately from the grounding of the controller and its peripheral devices.**

Grounding

Warning

1. **Make sure the product is grounded to ensure the noise tolerance of the controller.**

2. **Use a dedicated grounding.**

Use a D-class grounding (ground resistance 100 Ω or less).

3. **The grounding point should be as close as possible to the controller, and the ground wires as short as possible.**

4. **In the unlikely event that malfunction is caused by the ground, it may be disconnected.**

Wiring

Warning

1. **Do not apply any excessive force to cables by repeated bending, tensioning or placing a heavy object on the cables.**

It may cause an electric shock, fire, or breaking of wire.

2. **Connect wires and cables correctly.**

Incorrect wiring could break the controller or its peripheral devices depending on the seriousness.

3. **Do not connect wires while the power is supplied.**

It can break the controller or its peripheral devices could be damaged to cause a malfunction.

4. **Do not carry the product by holding its cables.**

It may cause an injury or damage to the product.

5. **Do not connect power or high voltage cables in the same wiring path as the unit.**

The product can malfunction due to noise and surge voltage interference in the signal line from the power and high voltage cables.

Separate the wiring of the controller and its peripheral device from that of power and high voltage cables.

6. **Verify wiring insulation.**

Insulation failure (interference with other circuits, poor insulation between terminals, etc.) could introduce excessive voltage or current to the controller or its peripheral devices and damage them.

Maintenance

Warning

1. **Perform maintenance checks periodically.**

Confirm wiring and screws are not loose. Loose screws or wires may cause unexpected malfunction.

2. **Conduct an appropriate functional inspection and test after completed maintenance.**

In case of any abnormalities (if the actuator does not move or the equipment does not operate properly, etc.), stop the operation of the system. Otherwise, unexpected malfunction may occur and safety cannot be assured. Conduct a test of the emergency stop to confirm the safety of the equipment.

3. **Do not disassemble, modify or repair the controller or its peripheral devices.**

4. **Do not put anything conductive or flammable inside the controller.**

Otherwise, fire can result.

5. **Do not conduct an insulation resistance test or insulation withstand voltage test.**

6. **Reserve sufficient space for maintenance.**

Design the system so that it allows required space for maintenance.



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