Programmable Multi-Axis Controller

CK3E

CSM_CK3E_DS_E_10_1

A controller with a width of only 28.6 mm provides complete control

Features

High-speed multi-axis control

- Up to 32 axes of control
- Motion control period: 250 μs or more

Flexibility

- CAD/CAM for easy motion control
- Flexible function development capability enables high-precision curve machining

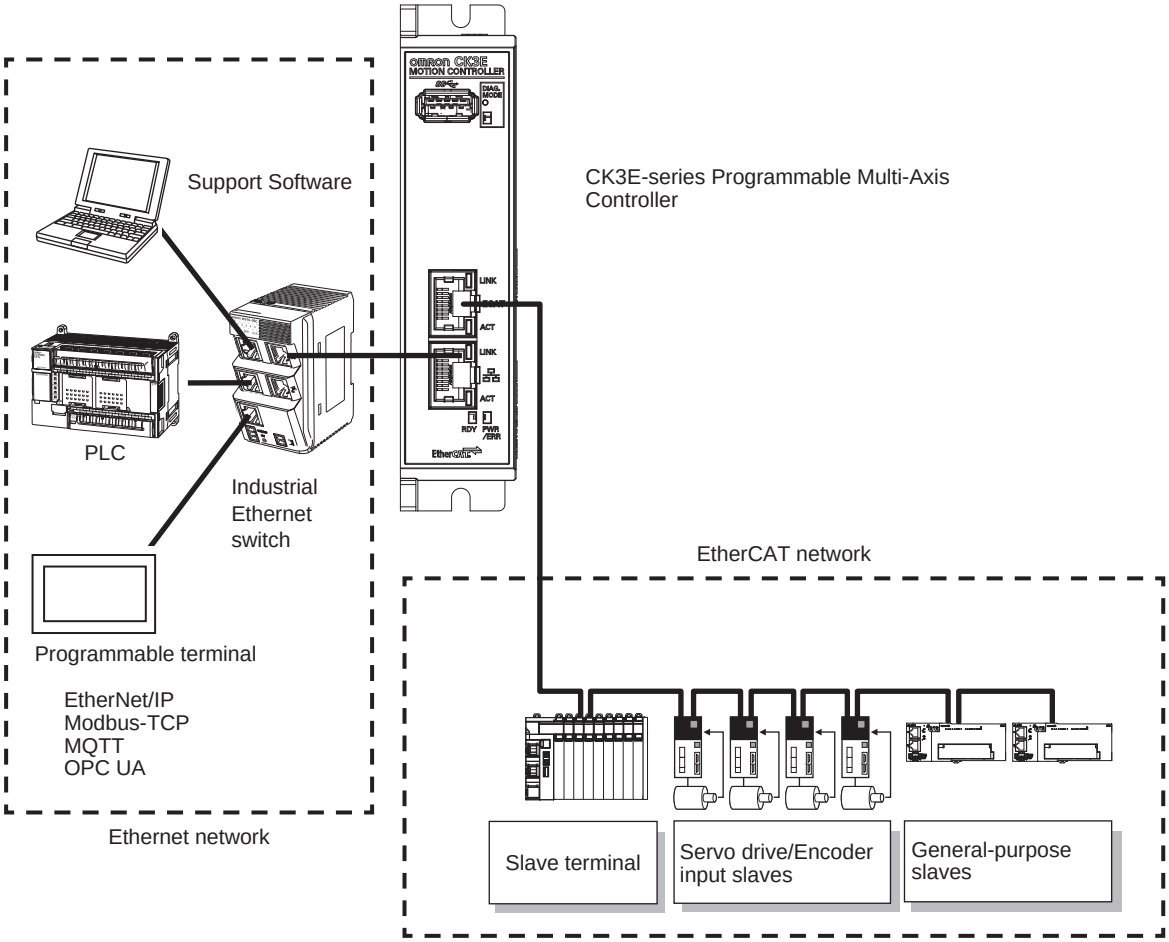
Saving space & wiring

- Footprint reduced to 1/4 (Based on Omron investigation)
- EtherCAT for flexible system configurationAdvanced security function with 32 digit security password

Secure host connection

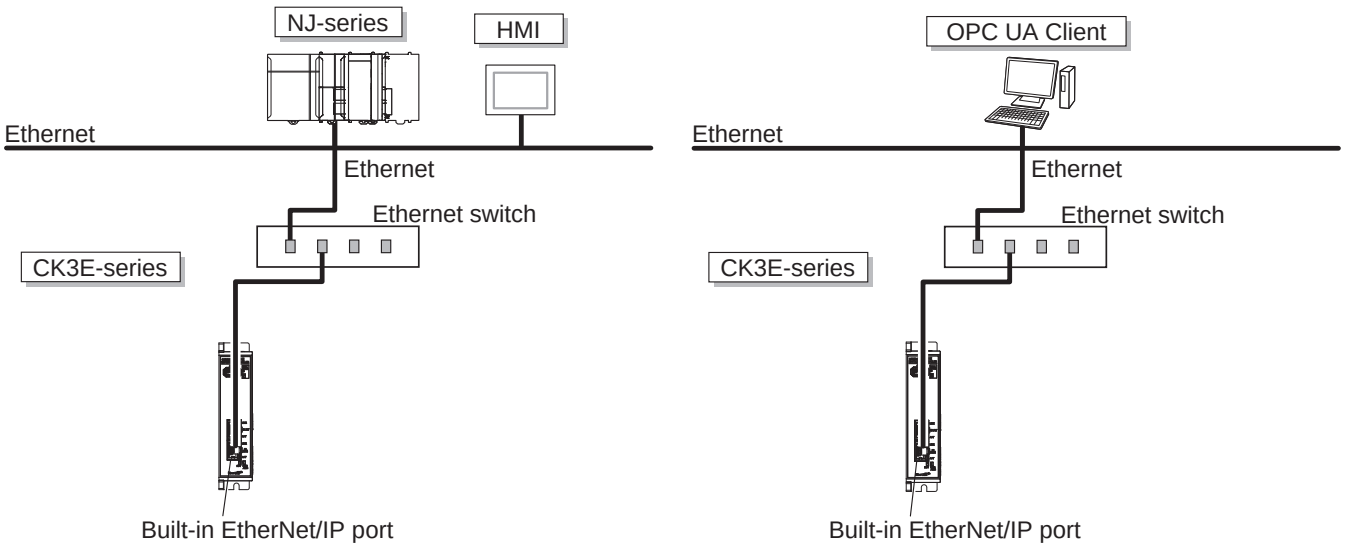
- The OPC UA and MQTT communication are supported. (Firmware revision 2.8.1 or later.)

System Configuration



Ethernet Network Configuration

The Ethernet communications port on the CK3E-series CPU Unit supports the EtherNet/IP, Modbus-TCP, OPC UA and MQTT protocols.
It can be connected to devices such as PLCs and programmable terminals that support the EtherNet/IP protocol or the Modbus-TCP protocol.
EtherNet/IP communications support targets only, so originators are required for the communications. If the originator in use is an NJ/NX-series CPU Unit, refer to the *NJ/NX-series CPU Unit Built-in EtherNet/IP Port User's Manual* (Cat. No. W506) for details.
CPU Unit connection settings are required for EtherNet/IP communications. Refer to the *Power PMAC IDE User Manual* (Cat. No. O016) for details.
OPC UA and MQTT can be connected to the Ethernet communication port of the CPU Unit, and variables in the CPU Unit can be read and written using OPC UA communication or MQTT communication.



Ordering Information

Product	Specifications			Model
	Memory	Ports	Max. no. of controlled axes at EtherCAT port	
Programmable Multi-Axis Controller	Main memory: 1 GB Flash memory: 2 GB ✻1	EtherNet/IP port: 1 EtherCAT port: 1	8	**CK3E-1210**
			16	**CK3E-1310**
			32	**CK3E-1410**

✻1. The flash memory of the CPU unit firmware revision 2.7 or earlier is 1 GB.

Optional Hardware

Product name	Specifications	Model
USB Flash Drives	Capacity: 2 GB	**FZ-MEM2G**
Power supply	Output voltage: 24 VDC	**S8FS-G□□□24□**

Recommended EtherCAT Communications Cables

Use Straight STP (shielded twisted-pair) cable of category 5 or higher with double shielding (braiding and aluminum foil tape) for EtherCAT.
For EtherCAT, use a shielded twisted-pair cable (double shielding with aluminum tape and braiding) of Ethernet category 5 (100BASETX) or higher, and use straight wiring.
For Ethernet, required specification for the communications cables varies depending on the baud rate.
For 100BASE-TX/10BASE-T, use an STP (shielded twisted-pair) cable of Ethernet category 5 or higher. You can use either a straight or cross cable.
For 1000BASE-T, use an STP (double shielding with aluminum tape and braiding) cable of Ethernet category 5e or higher. You can use either a straight or cross cable.
In the table, materials indicated available for Ethernet 100BASE-TX are available for both of 100BASE-TX and 10BASE-T.

Cable with Connectors

Item		Appearance	Recommended manufacturer	Cable length (m)	Model
Products for EtherCAT	Cable with Connectors on Both Ends (RJ45/RJ45) Standard RJ45 plugs type ✻1 Wire Gauge and Number of Pairs: AWG26, 4-pair Cable Cable Sheath material: PUR Cable color: Yellow ✻2 EtherCAT/ EtherNet/IP (10BASE/100BASE)		OMRON	0.3	**XS6W-6PUR8SS30CM-YF**
				0.5	**XS6W-6PUR8SS50CM-YF**
				1	**XS6W-6PUR8SS100CM-YF**
				2	**XS6W-6PUR8SS200CM-YF**
				3	**XS6W-6PUR8SS300CM-YF**
				5	**XS6W-6PUR8SS500CM-YF**
	Cable with Connectors on Both Ends (RJ45/RJ45) Rugged RJ45 plugs type ✻1 Wire Gauge and Number of Pairs: AWG22, 2-pair Cable Cable color: Right blue EtherCAT/ EtherNet/IP (10BASE/100BASE)		OMRON	0.3	**XS5W-T421-AMD-K**
				0.5	**XS5W-T421-BMD-K**
				1	**XS5W-T421-CMD-K**
				2	**XS5W-T421-DMD-K**
				5	**XS5W-T421-GMD-K**
				10	**XS5W-T421-JMD-K**
	Cable with Connectors on Both Ends (M12 Straight/ M12 Straight) Shield Strengthening Connector cable ✻3 M12/Smartclick Connectors Wire Gauge and Number of Pairs: AWG22, 2-pair Cable Cable color: Black EtherCAT/ EtherNet/IP (10BASE/100BASE)		OMRON	0.5	**XS5W-T421-BM2-SS**
				1	**XS5W-T421-CM2-SS**
				2	**XS5W-T421-DM2-SS**
				3	**XS5W-T421-EM2-SS**
				5	**XS5W-T421-GM2-SS**
				10	**XS5W-T421-JM2-SS**
	Cable with Connectors on Both Ends (M12 Straight/ RJ45) Shield Strengthening Connector cable ✻3 M12/Smartclick Connectors Rugged RJ45 plugs type Wire Gauge and Number of Pairs: AWG22, 2-pair Cable Cable color: Black EtherCAT/ EtherNet/IP (10BASE/100BASE)		OMRON	0.5	**XS5W-T421-BMC-SS**
				1	**XS5W-T421-CMC-SS**
				2	**XS5W-T421-DMC-SS**
				3	**XS5W-T421-EMC-SS**
				5	**XS5W-T421-GMC-SS**
				10	**XS5W-T421-JMC-SS**

✻1. Standard type cables length 0.2, 0.3, 0.5, 1, 1.5, 2, 3, 5, 7.5, 10, 15 and 20 m are available.
Rugged type cables length 0.3, 0.5, 1, 2, 3, 5, 10 and 15 m are available.
For details, refer to Cat.No.G019.
✻2. Cables colors are available in blue, yellow, or Green.
✻3. For details, contact your OMRON representative.

Cables / Connectors

Item			Recommended manufacturer	Model
Products for EtherCAT or Ethernet (1000BASE-T/100BASE-TX)	Wire Gauge and Number of Pairs: AWG24, 4-pair Cable	Cables	Kuramo Electric Co.	**KETH-SB** ✻1
		RJ45 Connectors	Panduit Corporation	**MPS588-C** ✻1
Products for EtherCAT or Ethernet (100BASE-TX)	Wire Gauge and Number of Pairs: AWG22, 2-pair Cable	Cables	Kuramo Electric Co.	**KETH-PSB-OMR** ✻2
			JMACS Japan Co., Ltd.	**PNET/B** ✻2
		RJ45 Assembly Connector 	OMRON	**XS6G-T421-1** ✻2

✻1. We recommend you to use above cable for EtherCAT and Ethernet, and RJ45 Connector together.
✻2. We recommend you to use above cable for EtherCAT and Ethernet, and RJ45 Assembly Connector together.
Note: Connect both ends of cable shielded wires to the connector hoods.

Support Software

The following table shows the Support Software used to configure, monitor, program, and debug the Programmable Multi-Axis Controller.

Software Name		Application	How to Procure
Power PMAC IDE ✻		This computer software is used to configure the Controller, create user programs, and debug the programs.	This is free software. Contact your OMRON representative for information on how to procure.
Power PMAC NC	Power PMAC-NC SDK	This computer software is used to control working machines and other CNC machines with the Controller. Use this software when you want to customize the HMI screen. The product contains extension source codes used for customization.	This is non-free software. Contact your OMRON representative for information on how to procure.
	Power PMAC-NC Runtime	This computer software is used to control working machines and other CNC machines with the Controller. Use this software when you do not customize the HMI screen.	This is non-free software. Contact your OMRON representative for information on how to procure.
EC Engineer		This computer software is used to configure and monitor the EtherCAT network by using the Controller as the EtherCAT master.	This is free software. Contact your OMRON representative for information on how to procure.

Note: PMAC is an abbreviation for Programmable Multi Axis Controller.
✻ For CK3E version 2.3 or earlier, use Power PMAC IDE version 2.2 or later. For CK3E version 2.4 or later, use Power PMAC IDE version 4.1 or later.

General Specifications

Item		Specification		
		CK3E-1210	CK3E-1310	CK3E-1410
Enclosure		Mounted in a panel		
Grounding method		Ground to 100 Ω or less		
Dimensions (height × width × depth)		130.4(H) × 28.6(D) × 170.9(W) mm		
Weight		540 g or less		
Unit power supply rated voltage		24 VDC (20.4 to 26.4 VDC)		
Unit power supply current consumption		660 mA or less		
Operating environment	**Ambient operating temperature**	0 to 45°C		
	Ambient operating humidity	10 to 95% RH (without condensation and icing)		
	Atmosphere	Must be free from corrosive gases.		
	Ambient storage temperature	-25 to +70°C (without condensation and icing)		
	Vibration resistance	Conforms to IEC 60068-2-6. 5 to 8.4 Hz with amplitude of 3.5 mm, 8.4 to 150 Hz, acceleration of 9.8 m/s^2 100 min each in X, Y, and Z directions (10 sweeps of 10 min each = 100 min total)		
	Shock resistance	Conforms to IEC 60068-2-27, 147 m/s^2, 3 times each in X, Y, and Z directions		
Applicable standards ✻		EU: EN 61326, RCM, KC Registration, UL		

✻ For the latest applicable standards for each model, visit the OMRON website (www.ia.omron.com), or contact your OMRON representative.

Performance/Function Specifications

Item			Specification		
			CK3E-1210	CK3E-1310	CK3E-1410
Memory			Main memory: 1 GB Flash memory: 2 GB ✻1		
External terminals			Communications Connector For EtherCAT communications. • RJ45 × 1 (Shield supported) For Ethernet communications. • RJ45 × 1 (Shield supported)		
			Power supply input terminal For Unit power supply × 1		
			USB port For external memory connection, USB 3.0 host × 1 Type A		
Motion control	Maximum Number of Controlled Axes		8 axes	16 axes	32 axes
	Motion control period		250 μs or more		
	Control method		Issuing control commands using EtherCAT communications		
EtherCAT communications specifications	Communications protocol		EtherCAT protocol		
	Baud rate		100 Mbps		
	Physical layer		100BASE-TX (IEEE 802.3)		
	Topology		Line, daisy chain, and branching		
	Transmission media		Twisted-pair cable of category 5 or higher (double-shielded cable with aluminum tape and braiding)		
	Transmission distance		Distance between nodes: 100 m or less		
	Maximum number of slaves		32		
	Range of node addresses that can be set		1 to 32		
Ethernet Port	Baud rate		1 Gbps/100 Mbps		
	Physical layer		1000BASE-T/100BASE-TX		
	Frame length		1,514 bytes max.		
	Media access method		CSMA/CD		
	Modulation		Baseband		
	Topology		Star		
	Transmission media		Twisted-pair cable of category 5, 5e, or higher (shielded cable) ✻2		
	Maximum transmission distance between Ethernet switch and node		100 m		
	Maximum number of cascade connections		There are no restrictions if an Ethernet switch is used.		
	EtherNet/IP tag data link (cyclic communications) ✻3	Number of connections	32		
		Requested packet interval (RPI)	1 to 1,000 ms (0.5 ms units)		
		Allowed communications bandwidth per Unit	3,200 pps ✻4		
		IO connection size	Input: 504 bytes max. Output: 504 bytes max.		
	EtherNet/IP CIP message service ✻3	UCMM (unconnected message)	Number of servers that can perform communications simultaneously: 32		
	EtherNet/IP conformance test		CT17 comoliant		

Item		Specification		
		CK3E-1210	CK3E-1310	CK3E-1410
OPC UA ✻5	Connection ports	OPC UA Server can be used simultaneously standard with PMAC Ethernet communications		
	OPC UA Function	OPC UA Server		
	Transport Category	HTTPS UA-Binary UA-TCP UA-SC UA-Binary		
	Supported Server Category	Core 2017 Server Facet Embedded 2017 UA Server Profile Embedded DataChange Subscription Server Facet Event Subscription Server Facet Micro Embedded Device 2017 Server Standard 2017 Server Facet Standard DataChange Subscription 2017 Server Facet		
	Endpoint URL Server	opc.tcp://[IP address]: [port No.]/ By default, the following URL is used. opc.tcp://192.168.0.200:4840/		
	Maximum number of clients (Secure Channels)	10		
	Maximum number of subscriptions	200		
	Maximum number of monitored variables per server	3,000		
	Permissible Variables that can be published	Pointer Variables (M), Global Variables (P), EtherCAT IO Data Variables (Ecat[].Io[].Data)		
	OPC UA security mode and policy	Allowable security methods can be specified from the following (multiple specifications possible): • Both signature and encryption required: SignAndEncrypt Signature and encryption algorithm Signing and encryption algorithms: Basic256-Sha256/Basic256/Basic128Rsa15 (multiple specifications possible) • Only signature required: Sign Signature algorithm Signature algorithm: Basic256Sha256/Basic256/Basic128Rsa15 (multiple specifications possible) • Neither signature nor encryption required		
	Application authentication	X.509		
	User authentication	The following can be set: • User name and Password • Anonymous		
USB port	Physical layer	USB 3.0-compliant A-type connector, Output voltage 5 V, 0.9 A max.		
	Transmission distance	3 m max.		

✻1. The flash memory of the CPU unit firmware revision 2.7 or earlier is 1 GB.
✻2. Always use shielded cables for EtherNet/IP communications.
✻3. EtherNet/IP is available only for targets and not available for originators. EtherNet/IP is available only for PMAC firmware revision version 2.6.0 or later whose date of production is September 25th, 2020 or later (Lot number 25920 and later). Use Power PMAC IDE Ver.4.4.1 or a later version.
✻4. Represents Packet Per Second and indicates the number of sent or received packets that can be processed in a second.
✻5. The OPC UA server functions are supported with firmware revision 2.8.1 or later.

Restrictions on using the OMRON NX-Series Ethercat Coupler Unit

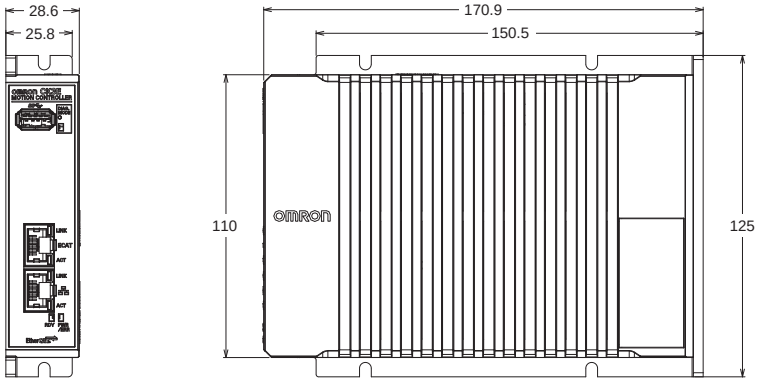
When OMRON NX-series EtherCAT Coupler Units are used as slaves of the Programmable Multi-Axis Controller as the EtherCAT master, the following models and unit versions of EtherCAT Coupler Units can be connected.

Model	Unit version	Connectable/Unconnectable
NX-ECC203	Ver. 1.4 or later	Connectable
	Ver. 1.3 or earlier	Unconnectable
NX-ECC202	All versions	
NX-ECC201	All versions	

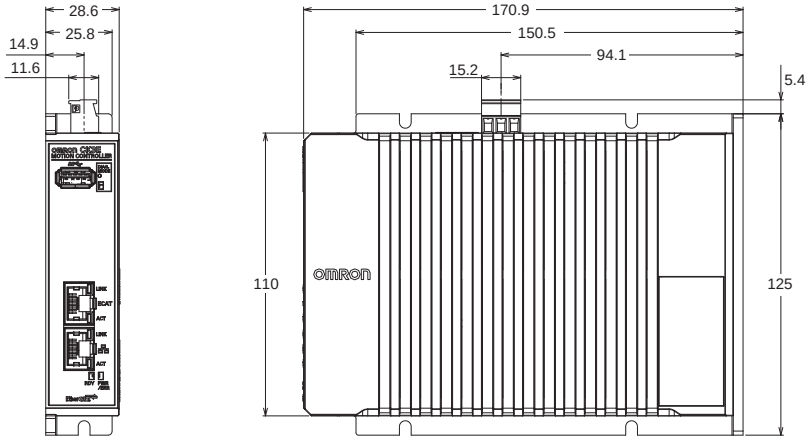
Dimensions

(Units: mm)

Main Body Only



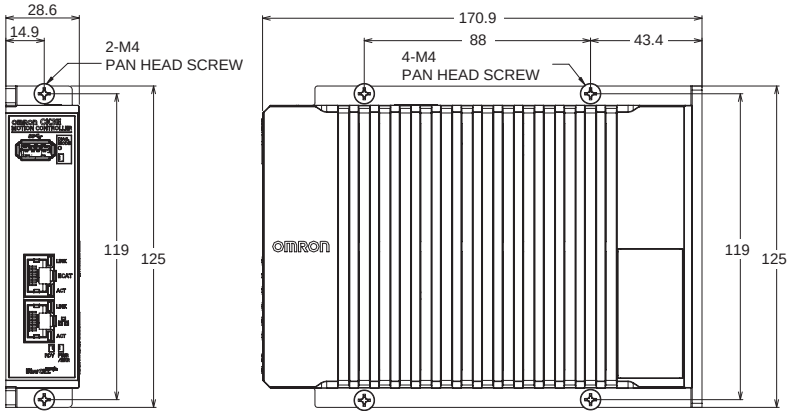
With Power Connector



Mounting Dimensions

Front mounting

Sideways mounting



Related Manuals

Contact your OMRON representative for details.

Man.No	Manual name	Application	Description
I610	CK3E-series Programmable Multi-Axis Controller Hardware User's Manual	Learning all basic information about the CK3E-series Programmable Multi-Axis Controller. This includes introductory information, installation, operating procedures and maintenance. Mainly hardware information is provided.	An introduction to the CK3E-series Programmable Multi-Axis Controller is provided along with the following information: • Overview • System Configurations • Specifications • Installation • Operating Procedures • Maintenance

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2025.4

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