Oriental motor

Driver for 2-Phase/5-Phase Stepper Motors

CVD Series

Multi-Axis Type EtherCAT Compatible

- This compact, lightweight 4-axis control driver reduces wiring and saves valuable space.
- Can be used with 2-phase/5-phase stepper motors and electric actuators
- EtherCAT communication enables synchronous operation
- Reduce host controller costs and program creation time by automatically controlling electromagnetic brakes and directly importing encoder information

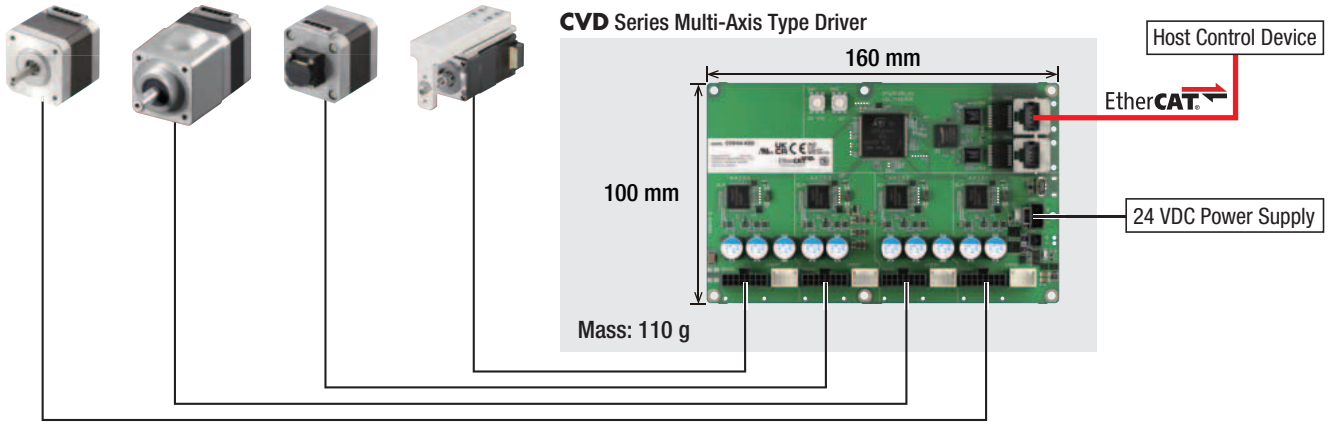
EtherCAT

Without Mounting Plate
Product name: **CVD4A-KED**

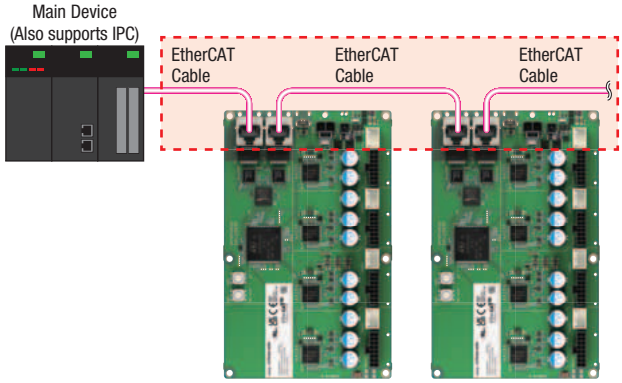
Right-Angle Type without Mounting Plate
Product Name: **CVD4AR-KED**

EtherCAT Compatible/4-Axis Control Reduces Wiring and Saves Space

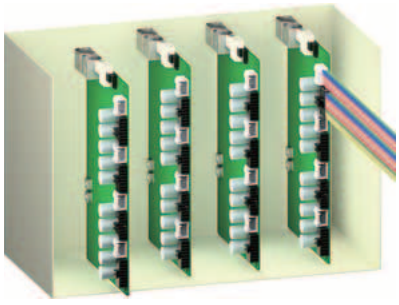
- I/O signals are consolidated into a single EtherCAT communication cable. Wiring for communication, power supply, etc. for 4-axis are integrated into a single driver
- Reduces work hours for wiring and decreases problems from mis-wiring
- Integrated management of device information including motor information by using an EtherCAT master



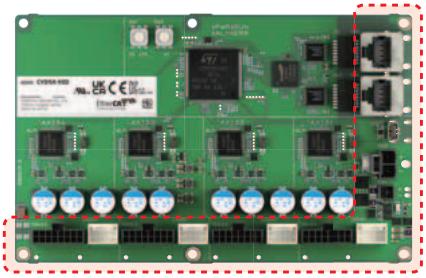
● Daisy-chain connection of multi-axis drivers is possible



● The right-angle connector direction type can be installed with several units placed side by side, eliminating crowded wiring and saving space.

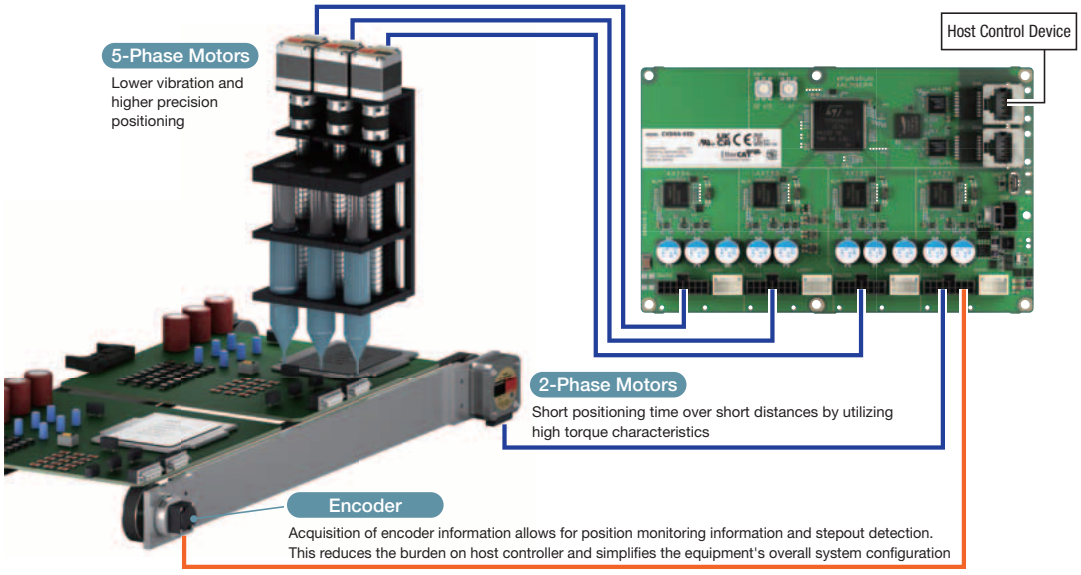


● Driver connector positions are concentrated on two sides. This simplifies wire bundling.



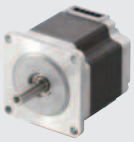
Combined Use of 2-Phase/5-Phase Motors and Synchronous Control is Possible Using EtherCAT Communication

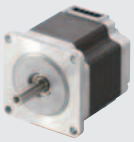
- A single driver can control 2-phase/5-phase motors and actuators, which reduces parts inventory and management costs
- Synchronous control is possible while utilizing the different characteristics of 2-phase/5-phase motors via EtherCAT communication

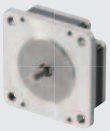


Many Combinations of Motors, Actuators, and Rotary Encoders are Possible

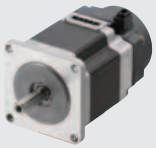
2-Phase Stepper Motor **PKP** Series Bipolar 4 Lead Wires


Standard


High Resolution


Flat


With Encoder


With Electromagnetic Brake

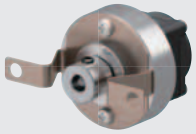

SH Geared


CS Geared

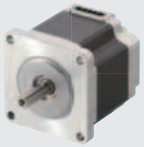

Flat Harmonic Gearhead

Rotary Encoder


Round Shaft

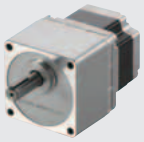

Hollow Shaft

5-Phase Stepper Motors **PKP/PK** Series


Standard


High Resolution


With Encoder


TS Geared

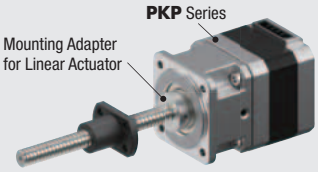

Vacuum

(Must check combination conditions, etc.
Please contact Oriental Motor for details.)

Compact Electric Cylinder **DRL Ⅱ** Series

Hollow Rotary Actuator **DH** Series

Mounting Adapter for Linear Actuator & Stepper Motor **PKP** Series



List of Combinations with the **CVD** Multi Axis Drivers

- 4 motors with input current of 0.5 to 3.0 A* (per axis) can be connected. (Max. 12 A per 1 driver)
- Can be combined with vacuum motors , but must check combination conditions, etc. Please contact Oriental Motor for details.

*Varies depending on the combined product.

Product Line	Series	Combined Products*1	Rated Current [A/Phase]
2-Phase Stepper Motors	**PKP** Series Bipolar 4 Lead Wires	**PKP203D06A**	0.6
		PKP213D05■	0.5
		PKP214D06■	0.6
		PKP22□D15■, **PKP22□D15■2**, **PKP22□MD15■**	1.5
		PKP23□D15■	1.5
		PKP23□D23■	2.3
		PKP24□D08■2	0.8
		PKP24□D15■, **PKP24□D15■2**, **PKP24□MD15■**, **PKP24□MD15■2**	1.5
		PKP24□D23■, **PKP24□D23■2**	2.3
		PKP25□D28■A2	2.8
		PKP26□D14■2	1.4
		PKP262FD15A	1.5
		PKP26□D28■, **PKP26□D28■2**, **PKP26□MD28■**, **PKP26□MD28■2**	2.8
5-Phase Stepper Motors	**PKP** Series	**PKP52□MN03**, **PKP52□N03**	0.3
		PKP52□MN07, **PKP52□N07**	0.7
		PKP52□N12	1.2
		PKP54□MN, **PKP54□N18■**, **PKP54□N18■2**	1.8
		PKP56□FMN, **PKP56□FN24■2**	2.4
	PK Series	**PK513**, **PK52□P**	0.35
		PK52□H, **PK54□**	0.75
		PK56□*2	1.4
Hollow Rotary Actuator	**DH** Series	**DHM28PAK2**, **DHM42PAK**	0.75
Compact Electric Cylinders	**DRL Ⅱ** Series	**DRLM20**	0.35
		DRLM28, **DRLM42**	0.75
		DRLM60	1.4

*1 Some product names are listed here. Can be combined with products containing the product names listed here.
Note that motors with voltage output type encoders are not listed.
A number indicating the length of the motor case is entered where the box □ is located within the motor product name.
Either **A** (single shaft), **B** (double shaft) or **M** (type with an electromagnetic brake) indicating the configuration is specified where the box ■ is located in the product name.

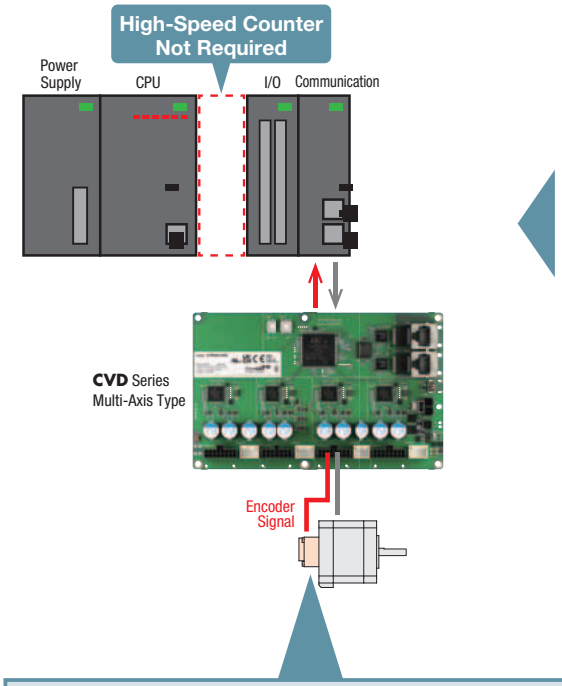
*2 This applies to motors with a rated current of 1.4 A/phase.

Acquire Encoder Information and Position Deviation Detection

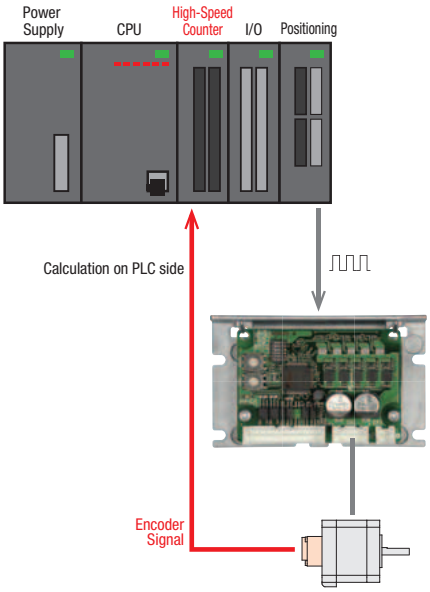
Driver includes a function to acquire encoder information. Position deviation can be detected by the driver and outputs a signal without the need for a host controller. The actual position and speed of the motor can also be monitored on a computer screen by using the support software **MEXE02**.

- No high-speed counter needed, reducing host controller costs
- Outputs signal to the host controller using EtherCAT communication. Reduces program creation time.

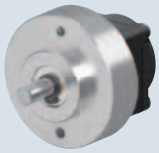
● **CVD** Series Multi-Axis Type



● Conventional Product



Compatible with both motors with encoders and rotary encoders

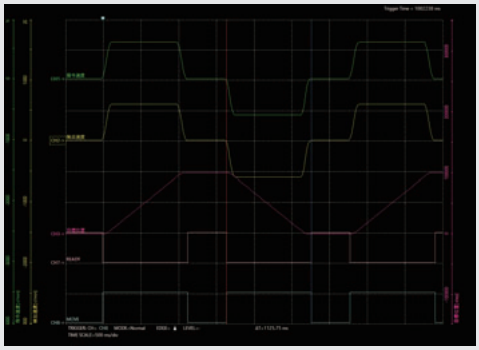
PKP Series With Encoder	Rotary Encoder
	
Resolution 2-Phase Motors: 200 P/R, 400 P/R, 1000 P/R 5-Phase Motors: 500 P/R, 1000 P/R	Resolution 1000 P/R, 2000 P/R

Encoder Input Unit Specifications		
Classification	Description	Description
A-Phase B-Phase	Output Type	Incremental
	Maximum Frequency	500 kHz (frequency for each of A-phase and B-phase)
	Edge Interval	500 nsec min.
	Count Range	−2,147,483,648～+2,147,483,647 count
	Count Method	90-degree phase difference input
	Multiplier	Quadrupling
	Interface	Differential receiver*
Z-Phase	Input Width	1 ms min.
	Interface	Differential receiver*
5 VDC Power Supply Output	Output Voltage	5 VDC ± 10%
	Output Current	200 mA max.

*The electrical characteristics of the encoder to be connected should be equivalent to 26C31.

●The Encoder Detection Information can be Monitored Using the Support Software **MEXE02** (Free)

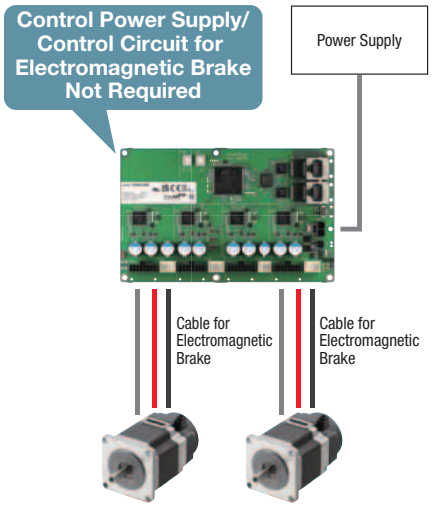
Measurement results can be saved as image files or data in CSV format



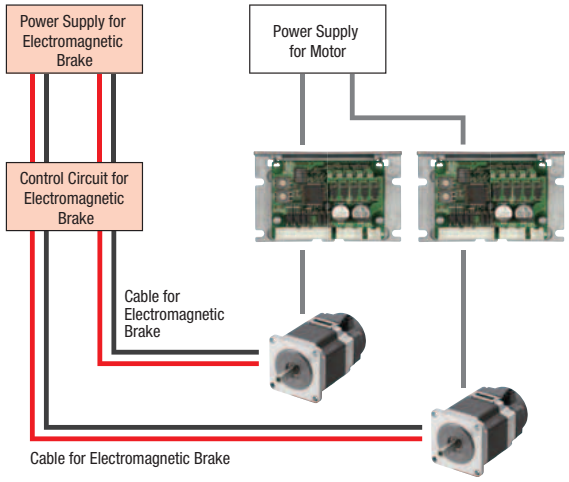
Automatic Control of Electromagnetic Brake and Power Supply

- No electromagnetic brake control circuit is needed, which reduces program creation time
- Reduced wiring work time

● **CVD** Series Multi-Axis Type

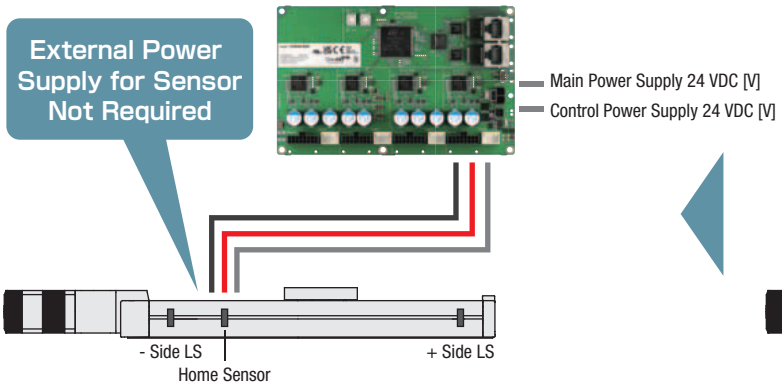


● Conventional Product

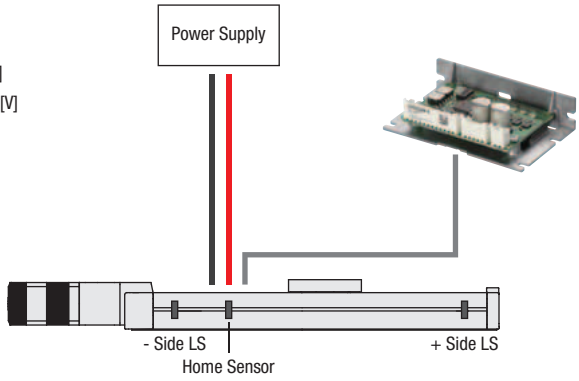


Can Provide Power to Sensors

● **CVD** Series Multi-Axis Type



● Conventional Product



Other Functions

Alarm Output

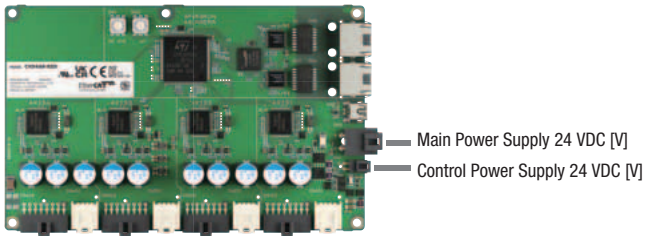
- Output of an excessive position deviation alarm allows for detection of motor misstep/stepout (Main circuit overheat alarm, etc. can also be output)

Information

- Can output driver temperature, overvoltage, undervoltage, etc. as general information
- Can be monitored using EtherCAT communication

Separation of Main Power and Control Power

- Supports addition of a separate external safety relay to shut off the main power supply
- Monitoring, etc. via EtherCAT communication is possible even when the main power supply is shut off



Main Power Supply Inrush Current Suppression Function

- This function protects the circuits in the main power supply unit from inrush currents that occur when the main power supply is turned on.

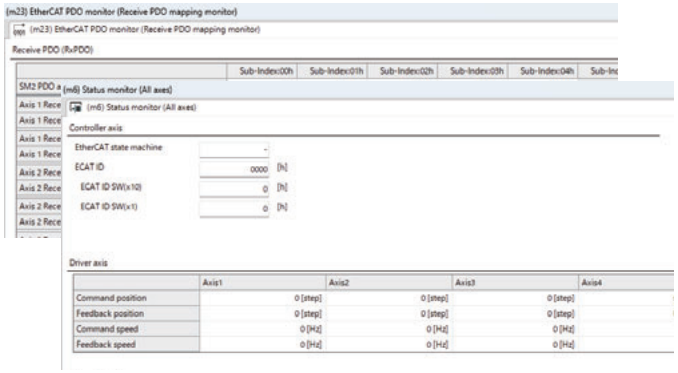
Support from Startup to Maintenance with the Support Software **MEXE02**

In addition to setting and editing the operating data and various parameters, teaching and monitoring various operating conditions can be performed using the support software **MEXE02**.

Startup and Evaluation

Various functions that are useful during wiring checks and test operation are available.

●Parameter setting ●Status monitor for all axes ●PDO monitor ●Remote operation

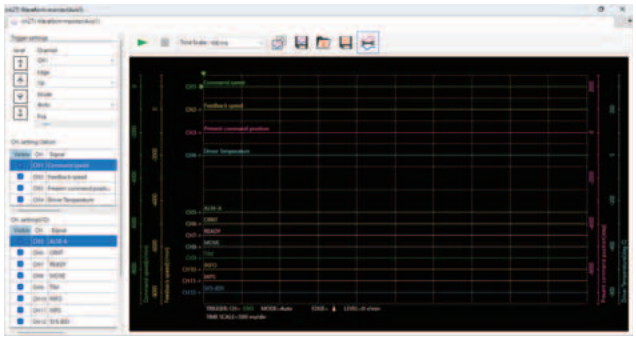


Adjustment

Functions to help adjust motor operation after the equipment is installed are available.

●Waveform monitor

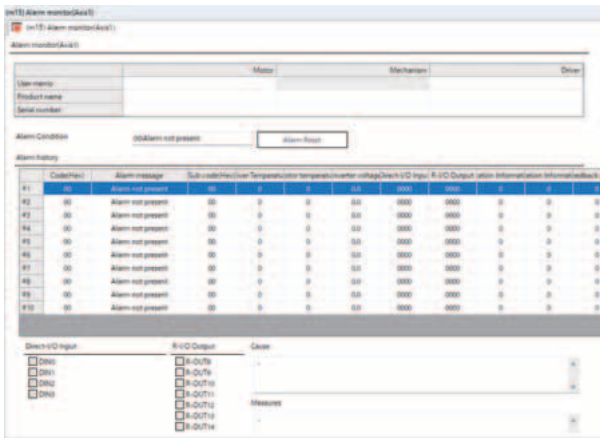
- Velocity demand value of motors, etc. can be monitored like an oscilloscope
- Waveform measurement results can be saved as images and in CSV format



Diagnostics and Maintenance

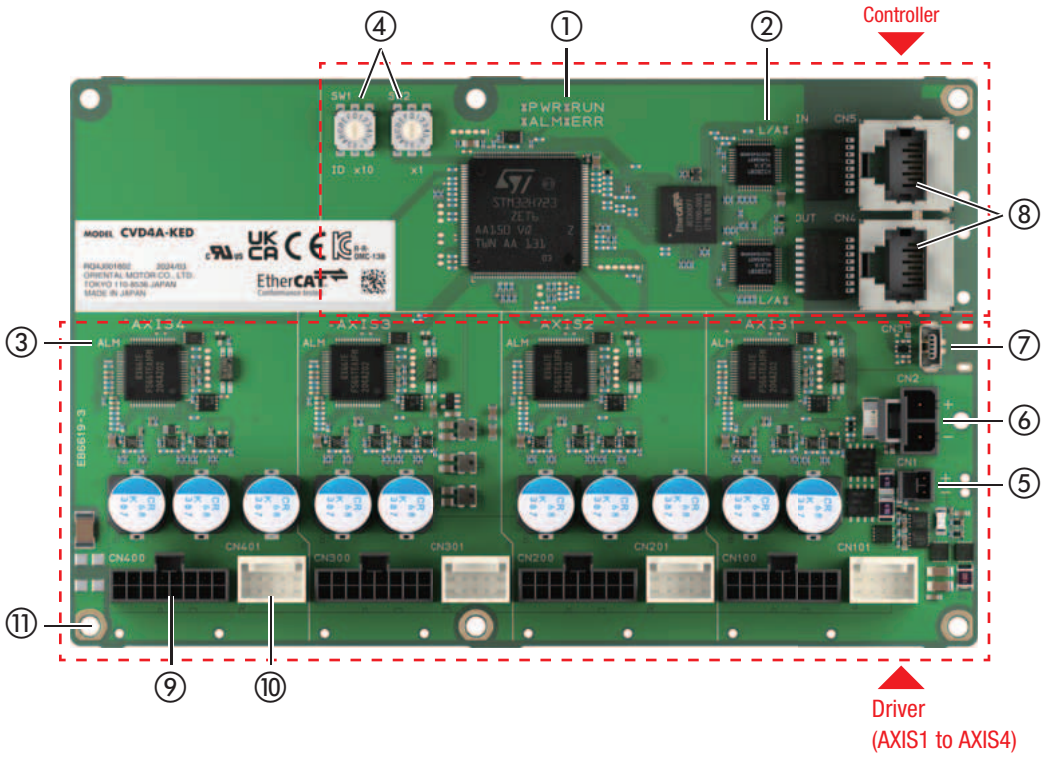
Useful functions for diagnosis and maintenance in case of trouble after the start of operation are available.

●Alarm monitor ●Unit information monitor ●Status monitor



Names and Functions of Driver Parts

Parameters can be set using the support software **MEXE02** or EtherCAT communication.



No.	Name	Description
①	PWR LED (Green)	Illuminated green when the main power supply is ON.
	RUN LED (Green)	Displays the EtherCAT communication status.
	ALM LED (Red)	Flashes or illuminates when an alarm is activated in the controller unit.
	ERR LED (Red)	Flashes when an error has occurred in the EtherCAT communication.
②	L/A LED (Green)	Displays the EtherCAT LINK/ACT status.
③	ALM1 ~ ALM4 LED (Red)	Flashes when an alarm is activated in the driver unit.
④	Node Address Setting Switch [SW1 (×10), SW2 (×1)]	Sets the driver's node address. Factory default settings: 0 [SW1 (×10): 0, SW2 (×1): 0]
⑤	Control Power Connector [CN1]	Connects the control power supply. (24 VDC)
⑥	Main Power Connector [CN2]	The main power supply is connected. (24 VDC)
⑦	USB Communication Connector [CN3]	Connects to the computer on which the data setting software **MEXE02** is installed using a USB cable. (USB 2.0 mini-B port)
⑧	EtherCAT Connectors [CN5 IN, CN4 OUT]	• CN5 IN: Connects to host-side EtherCAT compatible products. • CN4 OUT: Connects to the EtherCAT compatible device with the next machine number.
⑨	Motor Connectors [CN100, CN200, CN300, CN400]	Connects to the motor, electromagnetic brake and encoder.
⑩	I/O Connectors [CN101, CN201, CN301, CN401]	Connects the I/O signals.
⑪	Mounting Hole	Mount the driver using a screwdriver.

Product Specifications

Main Power Supply	Input Voltage	24 VDC ± 10%
Main Power Supply	Max. Input Current	0.5 ~ 3.0 A per axis* (Max. 12 A)
Control Power Supply	Input Voltage	24 VDC ± 5%
Control Power Supply	Max. Input Current	1.3 A (Excludes sensor power supply)
Control Input		4 Points, Photocoupler
Control Output		1 Point, Photocoupler and Open-Collector
Field Network		EtherCAT

*Varies depending on the combined product.

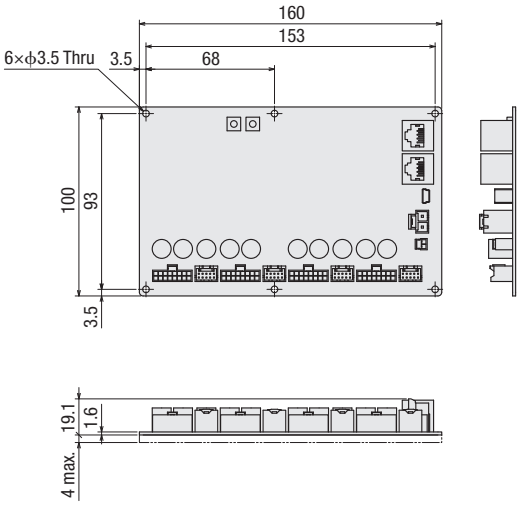
Communication Specifications

Communication Protocol	IEC 61158 Type12
Physical Layer/Protocol	100 BASE-TX (IEEE 802.3)
Transmission Rate	100 Mbps
Communication Cycle	· Free Run Mode: 1 ms min. · Sync Manager 2 Event Synchronization Mode: 1 ms min. · DC Mode: 0.5 ms, 1 ms, 2 ms, 3 ms, 4 ms, 5 ms, 6 ms, 7 ms, 8 ms
Communication Port/ Connector	RJ45× 2 (Shield-compatible) ECAT IN: EtherCAT input ECAT OUT: EtherCAT output
Topology	Daisy Chain (Max. 65,535 nodes)
Process Data	Variable PDO Mapping
Sync Manager	· SM0: Mailbox output · SM1: Mailbox input · SM2: Process data output · SM3: Process data input
Mailbox (CoE)	· Emergency Messages · SDO Request · SDO Response · SDO Information
Synchronization Mode	· Free Run Mode (Asynchronous) · Sync Manager 2 Event Synchronization Mode · DC Mode (SYNC0 event synchronization)
Device Profile	IEC 61800-7 CiA402 Drive Profile

Dimensions (Unit = mm)

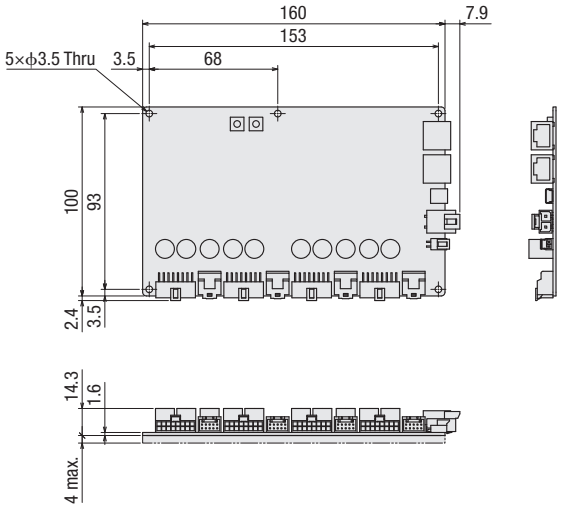
Without Mounting Plate

Mass 0.11 kg



Right-Angle Type without Mounting Plate

Mass 0.11 kg



Specifications are subject to change without notice. This catalog was published in September 2024.

ORIENTAL MOTOR U.S.A. CORP.

Western Sales and Customer Service Center
Tel: (310) 715-3301 Fax: (310) 225-2594

Los Angeles
Tel: (310) 715-3301

San Jose
Tel: (408) 392-9735

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