Oriental motor

MRCU Series
Operating Manual

WM-0006-4E



Thank you for purchasing an Oriental Motor product. This manual describes product handling procedures and safety precautions. Please read the manual thoroughly to ensure safe operation.

- Use the product correctly after thoroughly reading the section "Safety precautions" on page 5. In addition, be sure to observe the contents described in warning, caution, and note in this manual.
- This manual mainly describes the hardware of the product. For the control method, parameters, I/O signals, etc., refer to the “MRC01 User Manual.”

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Providing the EDS file

The EDS file (Electronic Data Sheets file) is a file that describes the specific information of the EtherNet/IP compatible products. By importing the EDS file into the configuration tool of the scanner, settings of EtherNet/IP can be made before the controller is in your hand.
For details, contact your nearest Oriental Motor sales office.

Safety precautions

The precautions described below are intended to ensure the safe and proper use of the product and to prevent the user and other personnel from exposure to the risk of injury. Use the product only after carefully reading and fully understanding these instructions.
In regard to a controller, it is prohibited to start operating the robot (i.e., to operate the device in accordance with the specified purpose) when the machine in which the controller is incorporated does not meet the relevant safety standards. The factory safety manager or safety personnel in charge of the applicable machine must ensure that the machine is operated only by qualified personnel who has expert knowledge on safety, and thereby prevent injury or damage to the machine.
The term “qualified personnel” refers to persons who have received the necessary training or education and have pertinent experience; who are familiar with the relevant standards and regulations; who are authorized by the factory safety manager to engage in the necessary activities; and who have the ability to discern and prevent potential dangers.

> ⚠ **WARNING**
>
> Handling the product without observing the instructions that accompany a “WARNING” symbol may result in serious injury or death.

> ⚠ **CAUTION**
>
> Handling the product without observing the instructions that accompany a “CAUTION” symbol may result in injury or property damage.

> **Note**
>
> The items under this heading contain important handling instructions that the user should observe to ensure safe use of the product.

> **Tip**
>
> The items under this heading contain related information and contents to gain a further understanding of the text in this manual.

WARNING

General

- Never use the product for equipment in connection with the maintenance or management of human life or health.
- Do not use the product in explosive or corrosive environments, in the presence of flammable gases, in areas subjected to splashing water, or near combustible materials. Doing so may result in fire or injury.
- Assign qualified personnel having expert knowledge on electrical and mechanical engineering as well as safety to the task of installing, wiring, operating/controlling, inspecting and troubleshooting the product. Handling by unqualified personnel may result in fire, injury, or damage to equipment.
- Conduct a risk assessment in a state where all parts and components including the product have been installed in the equipment. Failure to do so may result in injury or damage to equipment.
- Provide an interlocking guard at a position that meets the safety distance specified in EN ISO 13857 so that an operator or other personnel does not enter the movable range of the product while the equipment is operating Failure to do so may result in injury.
- When teaching, adjusting, or inspecting the product inside the cage with interlock, take appropriate safety measures according to the results of the risk assessment of the entire equipment. Failure to do so may result in injury.
- Provide appropriate safety measures so that the entire equipment will operate safely in the event of a system failure or malfunction. Failure to do so may result in injury.
- Provide an emergency stop function for the equipment. Failure to do so may result in injury.
- The function and performance of the safety-related control system are appropriately determined according to the results of the risk assessment of the entire equipment. This may result in injury.
- Use the product in a condition where the entire equipment complies with relevant international standards such as EN ISO 12100, EN ISO 10218-1, EN ISO 10218-2, national standards, and legal regulations such as occupational health and safety required in each country. Failure to do so may result in injury or damage to equipment.
- Do not disassemble or modify the product. Doing so may result in injury or damage to equipment.
- Perform the teaching operation outside the safety cage. Failure to do so may result in injury.
- When an alarm of the controller is generated (any of the controller's protective functions is triggered), remove the cause before resetting the alarm (protective function). Continuing the operation without removing the cause of the problem may cause the controller to malfunction, resulting in injury or damage to equipment.

Installation and wiring

- Install the controller inside an enclosure. Failure to do so may result in injury.
- Keep the input power voltage of the controller within the specified range. Failure to do so may result in fire.
- Connect the product securely according to the connection diagram. Failure to do so may result in fire.
- Do not forcibly bend, pull, or pinch the cable. Doing so may result in fire or damage to equipment.

Operation

- Take appropriate safety measures when placing the motor in a non-excitation state. Failure to do so may result in injury or damage to equipment.
- Check the condition of the surrounding area to ensure safety. This may cause injury or damage to equipment.
- Do not turn off the power or input a signal to place the motor in a non-excitation state during operation. The robot may move unexpectedly, causing injury or damage to equipment.
- Turn all input signals to the controller OFF before turning on the power supply. Failure to do so may result in injury or damage to equipment.
- Before operating a robot, check the setting value of the parameters. Failure to do so may result in injury or damage to equipment.
- Turn all output signals OFF before Implicit communication of EtherNet/IP is started. Failure to do so may result in injury or damage to equipment.
- In the event of a power failure, turn off the power supply to the controller and ensure that all input signals are OFF before turning the power supply back on. This may result in injury or damage to equipment.

CAUTION

- Do not use the product beyond its specifications. Doing so may result in injury or damage to equipment.
- Keep the area around the product free of combustible materials. Failure to do so may result in fire or a skin burn(s).
- Do not leave anything around the product that would obstruct ventilation. Doing so may result in damage to equipment.
- Keep your fingers and objects out of the openings in the controller. Failure to do so may result in fire or injury.
- Do not forcibly bend or pull the cable that is connected to the controller. Doing so may cause damage to the product.
- If any abnormality is observed, stop the operation immediately to turn off the power supply. Failure to do so may result in fire or injury.
- Use a DC power supply with reinforced insulation on its primary and secondary sides for a power supply. Failure to do so may result in electric shock.
- Do not touch the terminals while conducting the insulation resistance measurement or the dielectric strength test. Accidental contact may result in electric shock.
- Take measures against static electricity when handling the controller. The controller uses components that are sensitive to static electricity. Static electricity may cause the controller to malfunction or be damaged, resulting in injury or damage to equipment.

- When installing and wiring, take measures against EMC. Without effective measures to suppress Electromagnetic Interference (EMI) caused by the product in the surrounding control system equipment or Electromagnetic Susceptibility (EMS) generated by the product, the function of your equipment may be seriously affected. Verify EMC compliance with the completed equipment. Failure to do so may result in injury or damage to equipment.
- Do not ground the positive terminal of the power supply. Doing so may result in damage to equipment.
- Do not ground the positive terminal of the power supply. Doing so may result in damage to equipment.
- Connect a 2-pole circuit breaker or 2-pole circuit protector to the power supply to protect the positive and negative terminals of it. Failure to do so may result in fire or injury.
- When connecting the motors for each axis, check that the address number set for the connector (CN2) and the motor to be connected is correct.Wiring in the wrong combination may cause unexpected movement of the robot. This may result in injury or damage to equipment.

Precautions for use

Saving data to non-volatile memory

Do not turn off the control power supply while writing data to non-volatile memory, and do not turn off the control power supply for five seconds after writing has been completed. Doing so may abort writing the data and cause an alarm of EEPROM error to generate. Non-volatile memory can be rewritten approximately 100,000 times.

When conducting the insulation resistance measurement or the dielectric strength test, be sure to disconnect the controller from other products.

Conducting the insulation resistance measurement or the dielectric strength test with the controller and other products connected may result in damage to the controller.

Preparation

Checking the product

Verify that the items listed below are included. Report any missing or damaged items to the Oriental Motor sales office from which you purchased the product.

- Controller ...1 unit
- CN5 connector (20 pins)... 1 piece

How to identify the product model

Verify the model name of the purchased product against the model shown on the nameplate of the product.

MRCU	**6A**	**K**
1	2	3

1	Series	MRCU Series
2	Number of axes	3A: 3 axes 4A: 4 axes 5A: 5 axes 6A: 6 axes 7A: 7 axes 8A: 8 axes
3	Power supply specification	K: 24/48 VDC

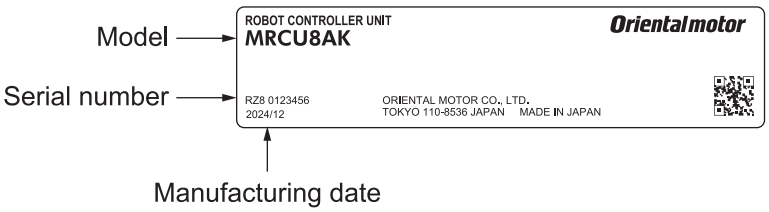
Products that can be combined

Series	Example of product model
OVR	OVR3046K10-H
AZ Series	AZM46AK
EAC Series	EACM2E05AZAK
EAS Series	EASM4NXD005AZAK
EZS Series	EZSM6D005AZAK
DR Series	DR28G2.5B03-AZAKU
DRS2 Series	DRSM60-05A4AZAK

Series	Example of product model
DGII Series	DGM85R-AZAK DGB85R12-AZAKR
EH Series	EH4-AZAKH
L Series	LM4F150AZAK-1
EL Series	EL1210AZMK

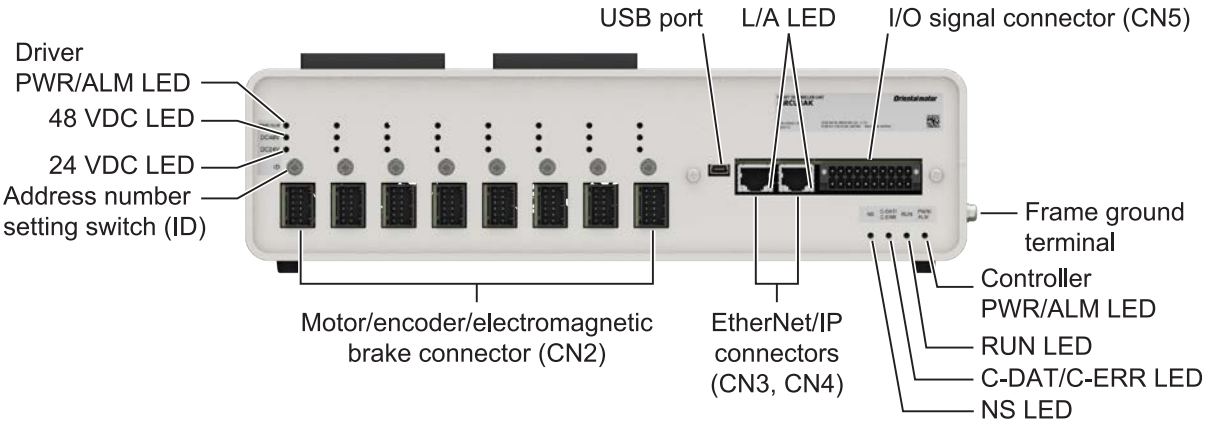
Information about nameplate

The figure shows an example.



Names of parts

Front



Type	Name	Description
Connectors	Motor/encoder/electromagnetic brake connector (CN2)	Connects the motor, the encoder, and the electromagnetic brake.
	EtherNet/IP connectors (CN3, CN4)	Connects the EtherNet/IP cable.
	I/O signal connector (CN5)	Connect when using direct I/O or sensors.
	USB port	Connects a PC in which the MRC Studio software has been installed. (USB2.0 mini-B port)
LED indicators	Controller PWR/ALM LED	This LED indicates the status of the controller.
	RUN LED (Green)	This LED is lit while the operation of the program set with the operation program of the MRC Studio software is being executed.
	C-DAT/C-ERR LED (Green/Red)	This LED indicates the communication status inside the controller.
	NS LED (Green/Red)	This LED indicates the communication status of EtherNet/IP.
	L/A LED (Green)	This LED indicates the LINK/ACT status of EtherNet/IP.
	Driver PWR/ALM LED (Green/Red/Blue)	This LED indicates the status of the driver.
	24 VDC LED, 48 VDC LED (Green)	This LED indicates the voltage of the main power supply that is being supplied to each axis.
Switch	Address number setting switch (ID)	Sets the address number (server address) of each axis.
Terminal	Frame ground terminal	Ground if necessary.

Back



Type	Name	Description
Connector	Power supply connector (CN1)	Connects a power supply.

Indication of LEDs

Controller PWR/ALM LED

This LED indicates the status of the controller.

LED status		Description
Green	Red	
No light	No light	The power supply is not turned on.
Light	No light	The power supply is on.
No light	Blinking	An alarm is being generated. The alarm item generated can be checked by counting the number of times the LED blinks. The LED is lit in green when the alarm is reset.
Blinking twice at the same time*		• Information is being generated. The LED is lit in green when the information is cleared. • The teaching screen is open on the MRC Studio software. The LED is lit in green when the teaching screen is closed.
Repeating “Green → Red → Simultaneously lit* → No light”		This is the simulation mode.

* Green and red colors may overlap and may be visible as orange.

RUN LED

This LED indicates the status of program operation.

LED status	Description
No sight	Program operation has not been executed.
Light	Program operation is being executed.

C-DAT/C-ERR LED

This LED indicates the communication status inside the controller.

LED status		Description
Green	Red	
No Light	No Light	• Information of the robot has not been written to the controller. • The power supply of the controller is not turned on.

LED status		Description
Green	Red	
Light	No Light	This is in an online state. Communication inside the controller is being performed properly.
Blinking	No Light	Communication inside the controller is established.
No Light	Light	An error in communication inside the controller has occurred.

NS LED

This LED indicates the communication status with the scanner via EtherNet/IP.

LED Status		Description
Green	Red	
No light	No light	• This is in an offline state. • The power supply of the controller is not turned on.
Blinking	No light	This is in an online state. Connection has not been established with the scanner.
Light	No light	This is in an online state. Connection is being established with the scanner.
No Light	Blinking	The connection to the scanner has timed out.
No Light	Light	The setting of an IP address is duplicated in the same system.
Blinking alternately		Self-diagnosis when the power is turned on is being executed.

Driver PWR/ALM LED

This LED indicates the status of the driver.

LED status	Description
No light	The main power supply and the control power supply are not turned on.
Green light	The main power supply and/or the control power supply are turned on.
Blinking red	An alarm is being generated. The alarm item generated can be checked by counting the number of times the LED blinks. The LED is lit in green when the alarm is reset.
Blinking blue	Information is being generated. The LED is lit in green when the information is cleared.

L/A LED

This LED indicates the LINK/ACT status of EtherNet/IP.

LED status	Description
No light	• This is in an offline state. • The frame of EtherNet/IP is not sent and received.
Blinking	• This is in an online state. • The frame of EtherNet/IP is sent and received.
Light	• This is in an online state. • The frame of EtherNet/IP is not sent and received.

Installation and connection

Installation location

The product described in this manual is designed and manufactured to be incorporated into general industrial equipment. Install it in a well-ventilated location that provides easy access for inspection. The location must also satisfy the following conditions:

- Operating ambient temperature: 0 to +40 °C [+32 to 104 °F] (non-freezing)
- Operating ambient humidity: 85 % or less (non-condensing)
- Inside an enclosure installed indoors (provide ventilation holes)
- Area free of explosive atmosphere, toxic gas (such as sulfuric gas), or liquid
- Area not exposed to direct sun
- Area free of excessive amount of dust, iron particles, or the like
- Area not subject to splashing water (rain, water droplets), oil (oil droplets), or other liquids
- Area free of excessive salt
- Area not subject to continuous vibration or excessive shocks
- Area free of excessive electromagnetic noise (from welders, power equipment, etc.)
- Area free of radioactive materials, magnetic fields, or vacuum
- Up to 1,000 m (3,300 ft.) above sea level

Installation method

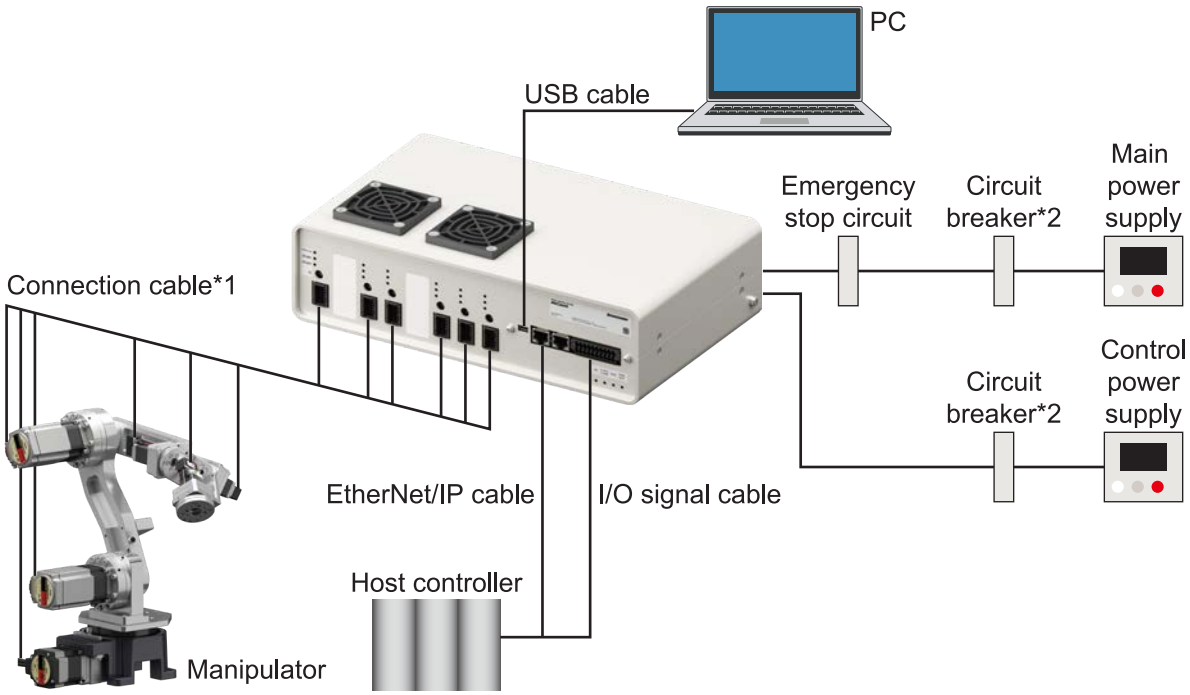
Install the controller vertically with the rubber feet facing down.

Note

- Do not install any equipment that generates a large amount of heat or noise near the controller.
- Do not cover the vents on top of the controller. Also, do not install the controller under a host controller or other heat-sensitive equipment.
- If the ambient temperature of the controller exceeds 40 °C (104 °F), reconsider the ventilation conditions, such as using fans for forced cooling or providing space between the controller and other products.



Connection example



*1 These are Oriental motor cables. Purchase is required separately.

*2 Connect a 2-pole circuit breaker or 2-pole circuit protector to the power supply to protect the positive and negative terminals of it.

Note

- Connect the connector securely. Insecure connector connection may cause malfunction or damage to the manipulator or controller.
- When connecting the cable, secure it so that no load is applied to the connector. Applying a load to the connector may result in a connection failure, causing the controller to malfunction.
- The controller uses parts that are sensitive to electrostatic charge. Take measures against static electricity since it may cause damage to the controller.
- Do not touch the controller while the power is on. Static electricity may cause the controller to malfunction.
- Keep 1 m (3.3 ft.) to 10 m (32.8 ft.) for wiring distance between a motor and controller. Maintain the wiring distance to shorter than 1 m (3.3 ft.) or longer than 10 m (32.8 ft.) may result in increase of the electrical noise emitted from the controller.

Tip

Before connecting or disconnecting a connector, turn off the power supply and check that the PWR/ALM LED on the controller and the PWR/ALM LED on the driver have been turned off.

Emergency stop circuit

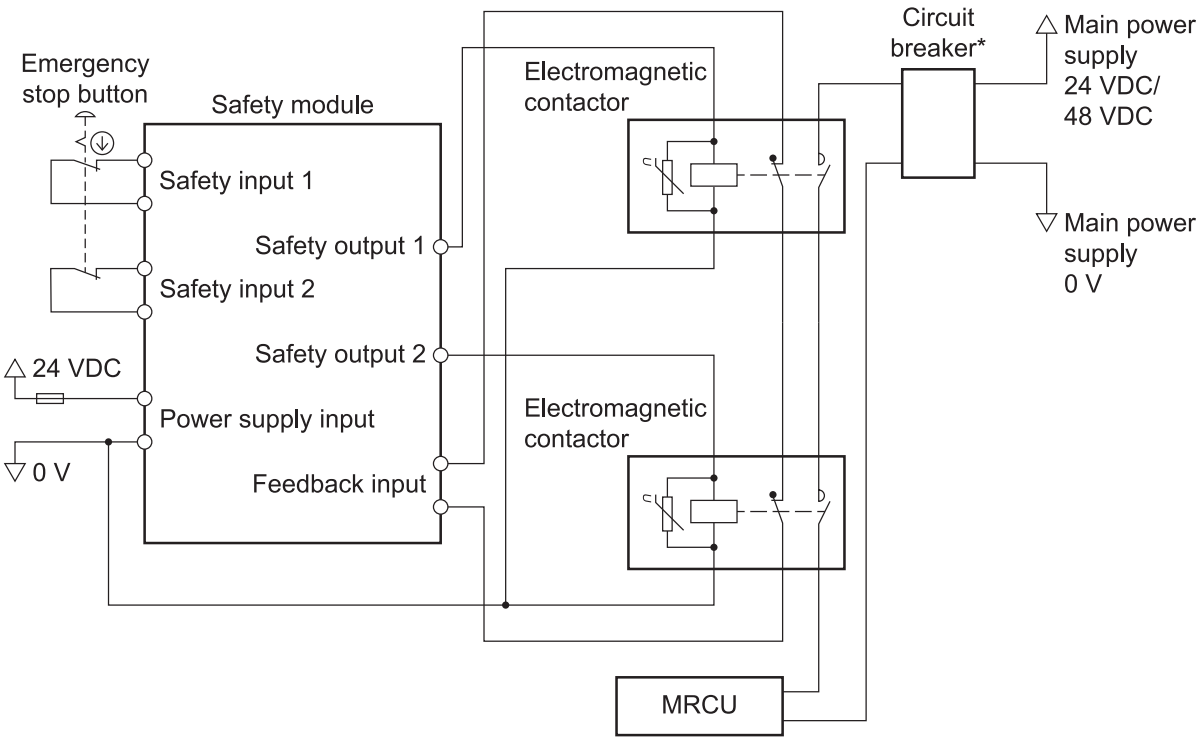
Design the emergency stop circuit so that the main power supply is shut off when the emergency stop button is pressed.
Select safety devices, such as an emergency stop button, safety module, or electromagnetic contactor, that meet the required performance level.

Note

Based on the results of the risk assessment performed by the customer, determine the configuration of the emergency stop circuit and the performance level (EN ISO 13849-1) that is complied with.

Wiring example for emergency stop circuit

Applicable standards and category	EN ISO 13849-1, category 3
Stop category (EN 60204-1)	Category 0 (Uncontrolled stop)



* Connect a 2-pole circuit breaker or 2-pole circuit protector to the power supply to protect the positive and negative terminals of it.

Operation in emergency stop

Pressing the emergency stop button forcibly shuts off the main power supply to the controller and stops the robot.
An axis using an electromagnetic brake motor is held in place by activating the electromagnetic brake.
An axis using a motor without an electromagnetic brake may be moved due to inertia or gravity.

Release of the emergency stop

When releasing the emergency stop state, follow the steps below.

> **Note**
>
> Before operating a robot again, check the condition of the surrounding area to ensure safety.

1. Reset the emergency stop button
2. When an alarm is generated, correct the cause of the alarm and ensure safety before resetting the alarm.

Connecting a power supply

Connect a main power supply and a control power supply to the power supply connector (CN1).

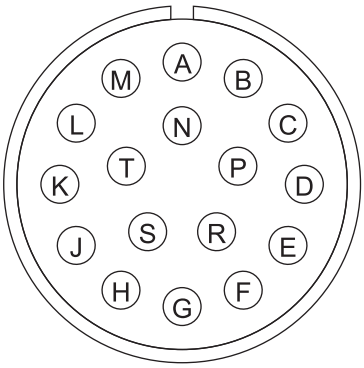
> **Note**
>
> Make sure the polarity of the power supply before connecting. Connecting the power supply with reversed polarity may damage the controller.

Recommended connectors

Type	Part number	Manufacturer
Straight plug	N/MS3106B20-29S	Japan Aviation Electronics Industry, Ltd.
Right angle plug	N/MS3108B20-29S	Japan Aviation Electronics Industry, Ltd.

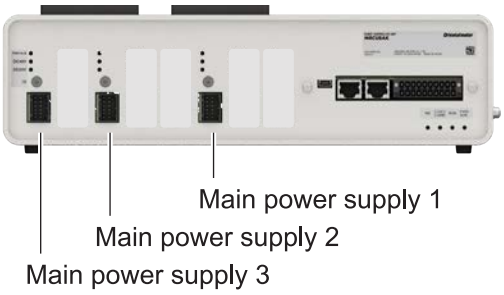
Pin assignment

The figure shows the view from the insert side of the contacts. Wire all terminals according to the pin assignments in the table.

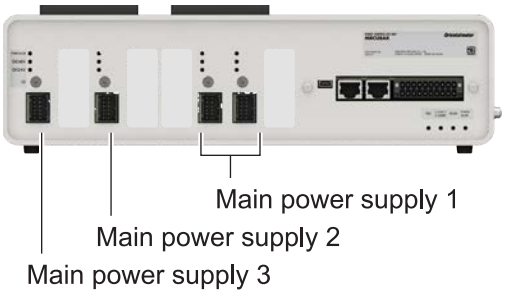


Number	Name
A	Main power supply 1
B	Ground (For main power supply 1)
C	Main power supply 2
D	Ground (For main power supply 2)
E	Main power supply 3
F	Ground (For main power supply 3)
G	Frame ground
H	Control power supply
J	Ground (For control power supply)
K to T	Reserved

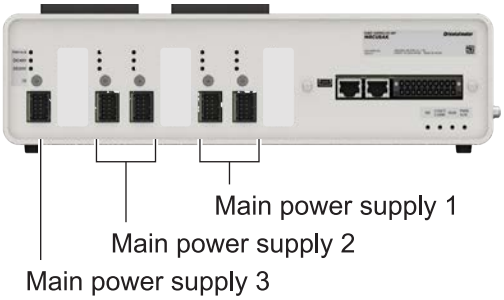
MRCU3AK



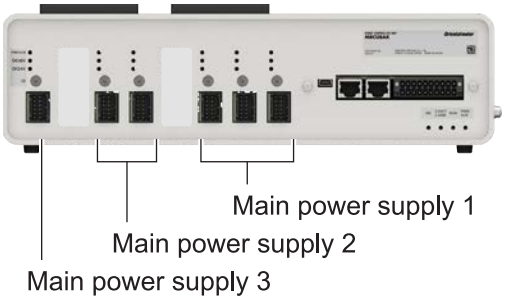
MRCU4AK



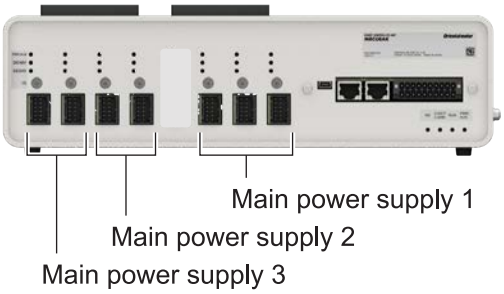
MRCU5AK



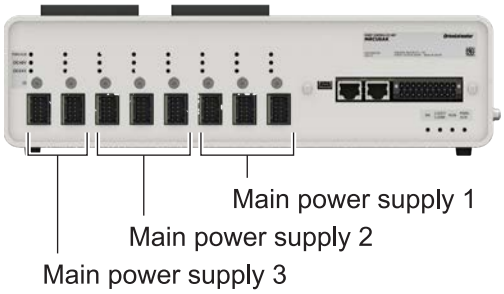
MRCU6AK



MRCU7AK



MRCU8AK



> **Tip**
>
> Since the main power supplies 1 through 3 are internally independent, wire the power to all of them.

Voltage specifications

The power supply input voltage specifications include the rated voltage and the allowable operating voltage.

	Rated voltage	Allowable operating voltage
Main power supply	24 VDC±5 % 48 VDC±5 %	24 VDC input: 20 to 32 VDC (22.8 to 32 VDC) 48 VDC input: 40 to 55 VDC
Control power supply	24 VDC±5 %	20 to 27.6 VDC (22.8 to 27.6 VDC)

* The value in parentheses ( ) is the value when the electromagnetic brake motor is connected.

Note

Do not apply 48 VDC to the control power supply. Doing so may result in damage to the controller.

Current capacity for main power supply

The current capacity for the main power supply varies depending on the product combined. Refer to the table below.

Series	Model	Power supply current capacity
OVR	OVR3041K3-H OVR3046K10-H OVR3070K3-H	6.7 A or more
	OVR3AL030030Z10K-C OVR3AR030030Z10K-C	6.9 A or more
	OVR4048K5-V OVR4068K5-V OVR4088K5-V	12.5 A or more
	OVR5035K1-V	14.3 A or more
	OVR5048K1-V	13.9 A or more
	OVR6048K1-V	15.3 A or more

Stepping motor

Series	Model	Power supply current capacity
AZ Series	AZM14	0.4 A or more
	AZM15	0.5 A or more
	AZM24 AZM26	1.4 A or more
	AZM46	1.6 A or more
	AZM48	2.1 A or more
	AZM66	3.7 A or more
	AZM69	3.5 A or more

Motorized actuator

For the EAC Series, EAS Series, and EZS Series, check the current capacity by referring to the equipped motor model.
The box (■) in the model indicates an alphabet (B, M, or R) representing the shape of the actuator.

Series	Model	Power supply current capacity
EAC Series EAS Series EZS Series	AZM24	1.4 A or more
	AZM46	1.6 A or more
	AZM66	3.7 A or more
DGII Series	DG■60	1.4 A or more
	DG■85	1.6 A or more
	DG■130	3.7 A or more
DR Series	DR20	0.4 A or more
	DR28	1.3 A or more
DRS2 Series	DRSM42	1.5 A or more
	DRSM60	2.6 A or more
EH Series	EH3	0.4 A or more
	EH4	1.4 A or more
L Series	LM2 LM4	3.7 A or more
EL Series	EL6 EL12	3.7 A or more

Current capacity for control power supply

Number of axes	Power supply current capacity	
	Without electromagnetic brake	With electromagnetic brake
3 axes	0.75 A or more	1.5 A or more
4 axes	0.9 A or more	1.9 A or more
5 axes	1.05 A or more	2.3 A or more
6 axes	1.2 A or more	2.7 A or more
7 axes	1.35 A or more	3.1 A or more
8 axes	1.5 A or more	3.5 A or more

Grounding

Ground the controller if necessary. Do not share the grounding wire with a welder or any other power equipment.
Applicable lead wire: AWG 16 to 14 (1.25 to 2.0 mm^2)

Connecting the EtherNet/IP cable

Connect the EtherNet/IP cable to the EtherNet/IP connector (CN3, CN4).

Connecting the USB cable

Using a USB cable with the following specifications, connect a PC on which the MRC Studio software has been installed to the USB port.

Specifications	USB2.0 (Full speed)
Cable	Length: 3 m (9.8 ft.) or less Shape: A to mini B

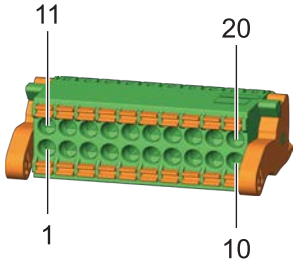
Tip

- Use a USB cable to connect directly to a PC.
- In large electrically noisy environments, use the USB cable with a ferrite core or install a ferrite core on the USB cable.

Connecting the I/O signals

Connect when using direct I/O or sensors.
Use the CN5 connector (20 pins) to connect the I/O signal cable to the I/O signal connector (CN5).

Pin assignment

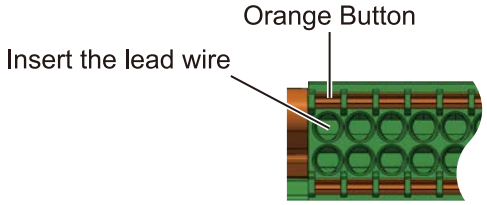


Pin number	Signal name	Description	Initial value
1	IN-COM	Common for IN0 to IN7 inputs	–
2	IN0	Control input 0	STOP
3	IN2	Control input 2	ETO-CLR-DRV
4	IN4	Control input 4	PAUSE
5	IN6	Control input 6	PRG-DIN0
6	OUT-COM	Common for OUT0 to OUT7 outputs	–
7	OUT0	Control output 0	READY
8	OUT2	Control output 2	ETO-MON-DRV
9	OUT4	Control output 4	PAUSE-BSY
10	OUT6	Control output 6	PRG-DOUT0
11	N.C.	–	–
12	IN1	Control input 1	FREE-RB
13	IN3	Control input 3	ALM-RST
14	IN5	Control input 5	Not used
15	IN7	Control input 7	PRG-DIN1
16	N.C.	–	–
17	OUT1	Control output 1	MOVE
18	OUT3	Control output 3	ALM-B
19	OUT5	Control output 5	PRG-RUN
20	OUT7	Control output 7	PRG-DOUT1

Connector wiring method

- Applicable lead wire: AWG 24 to 16 (0.2 to 1.25 mm^2)
- Stripping length of wire insulation: 10 mm (0.39 in.)

1. Strip the insulation of the lead wires.
2. Insert the lead wire while pressing the orange button with a screwdriver.
3. After having inserted, release the button to secure the lead wire.



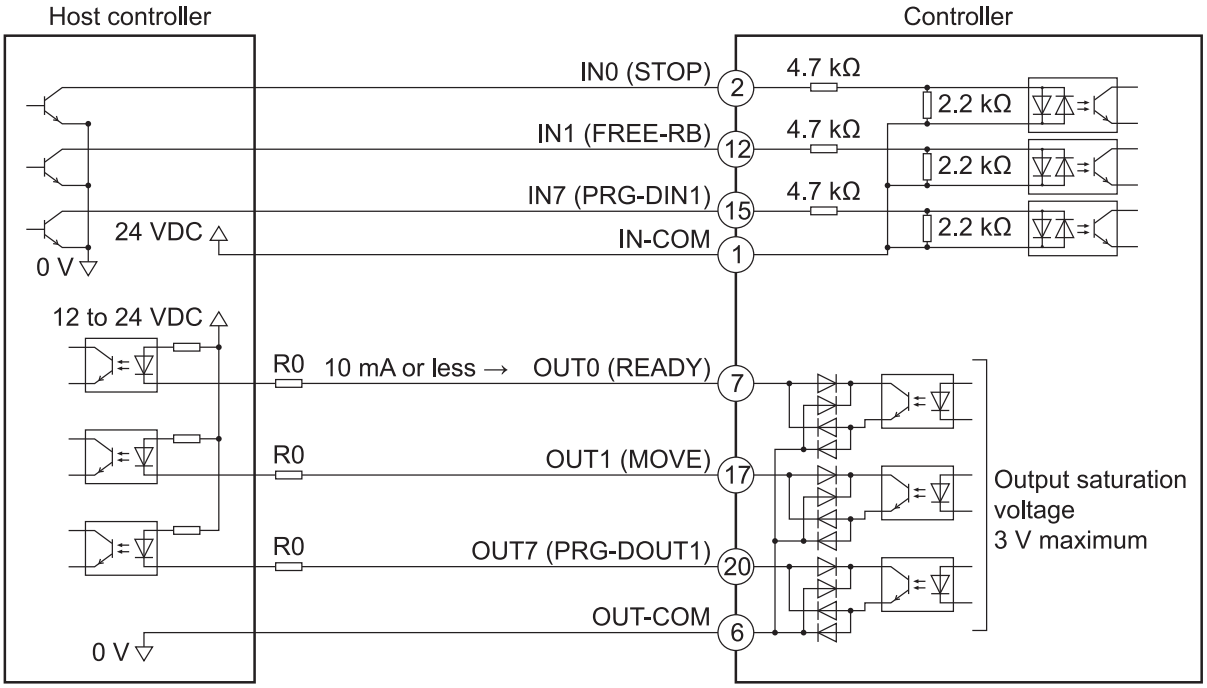
Connection example

Values in parentheses ( ) are initial values.

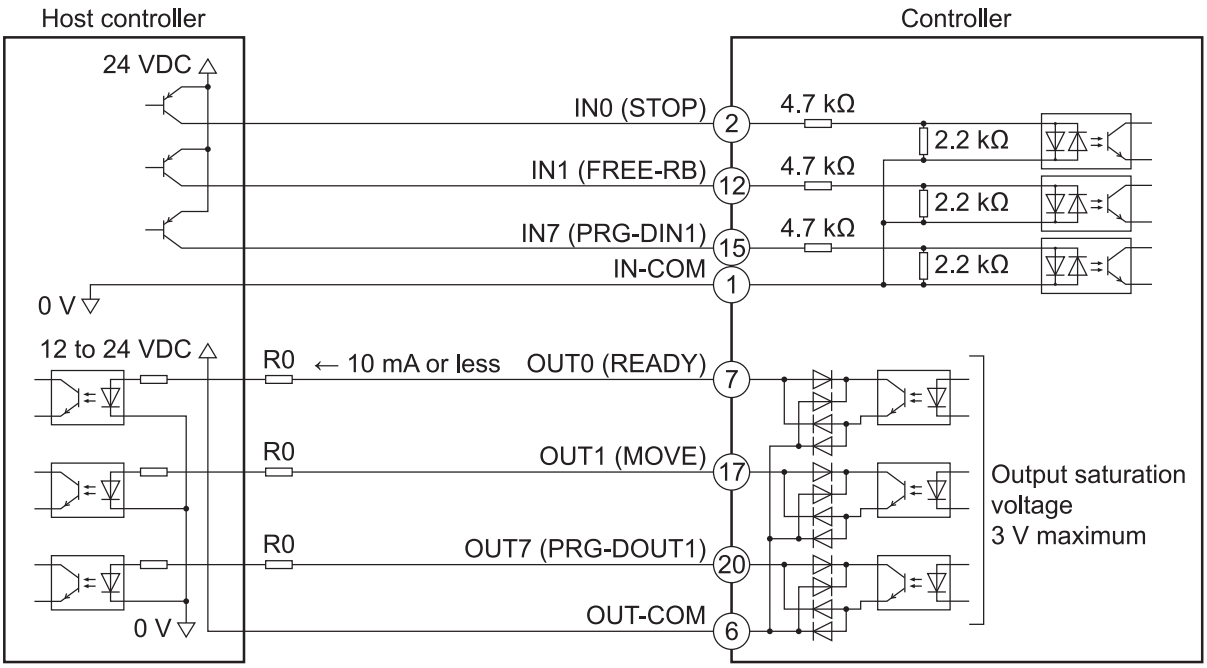
Note

- Use input signals at 24 VDC.
- Use output signals at 12 to 24 VDC, 10 mA or less. If the current exceeds 10 mA, connect an external resistor R0 to keep the current to 10 mA or less.

Connection example with a current sink output circuit



Connection example with a current source output circuit



Noise elimination measures

There are two types of electrical noise: One is noise that enters the controller from the outside and causes it to malfunction, and the other is noise that is emitted from the controller and causes peripheral equipment to malfunction.
For noise entering the controller from the outside, take measures to prevent the controller from malfunctioning. It is necessary to take appropriate measures because the signal lines are very likely to be affected by the noise.
For the noise that is emitted by the controller , take measures to suppress it.

Measures to eliminate electrical noise

- Use a DC power supply that complies with the EMC Directive.
- When relays or electromagnetic switches are used, use noise filters or CR circuits to suppress the surge generated by these devices.
- Keep the cables as short as possible.
- Use shielded twisted pair cables for power lines and signal lines.
- Keep power lines, such as motor and power supply cables, at least 100 mm (3.94 in.) away from signal lines. Also, do not bundle the cables or wire them in parallel. If the power cables and signal cables must cross, cross them at right angles.
- Wrap the cable around a ferrite core. This prevents the propagated noise from entering the driver or from being emitted from the driver. To increase the effect of noise attenuation by the ferrite core, wrap the cable several more turns.
- To ground a shielded cable, use a conductive cable clamp that ensures contact with the entire circumference of the shielded cable, and ground it as close to the equipment as possible.
- Use the shortest, thickest grounding wire possible.
- Choose a large and uniformly conductive surface for the grounding point.
- Ground the motor, controller, driver and other peripheral control equipment so that a potential difference does not occur among the grounds.

Oriental Motor noise suppression products

I/O signal cables

This is a Shielded cable to connect a driver and a host controller. The ground wires useful for grounding come out of both ends of the cable.
Refer to the product model here.

Surge suppressors

This product is effective in suppressing the surge that occurs in a contact part of the relay or electromagnetic switch. Connect it when using a relay or electromagnetic switch. A CR circuit for surge suppression and a CR circuit module are provided.
Refer to the product model here.

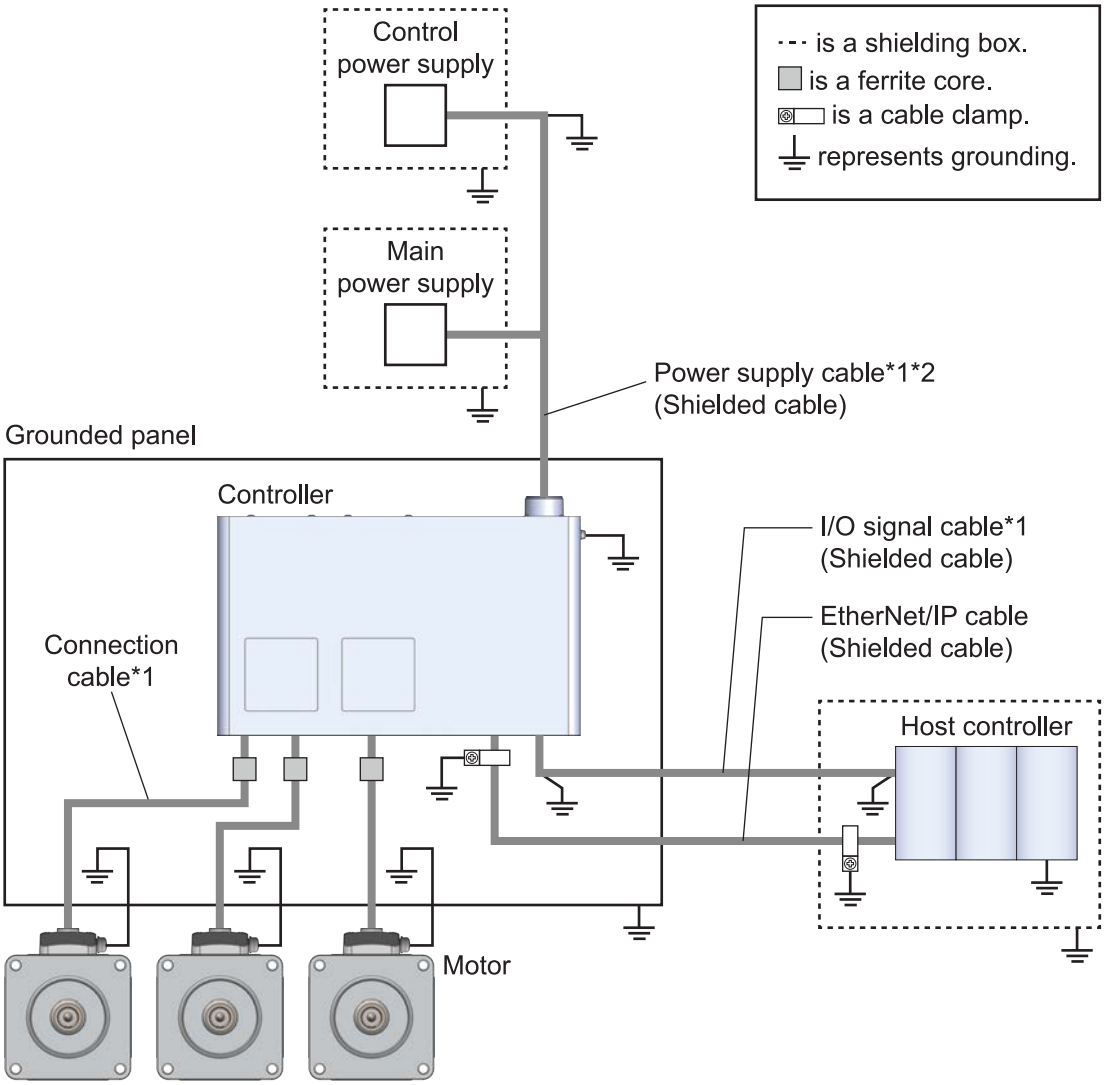
Compliance with the EMC Directive

Oriental Motor products are compliant with the EMC Directive in accordance with the contents of "Noise elimination measures" on page 28 under the terms of "Example of installation and wiring" on page 30.
The results of EMC testing of the equipment will vary depending on the type, layout, wiring method, etc. of the parts and components used.
Verify compliance with the EMC Directive in a condition where all parts and components, including this product, are assembled into the equipment.

⚠ CAUTION

This equipment is not intended for use in residential environments nor for use on a low-voltage public network supplied in residential premises, and it may not provide adequate protection to radio reception interference in such environments.

Example of installation and wiring

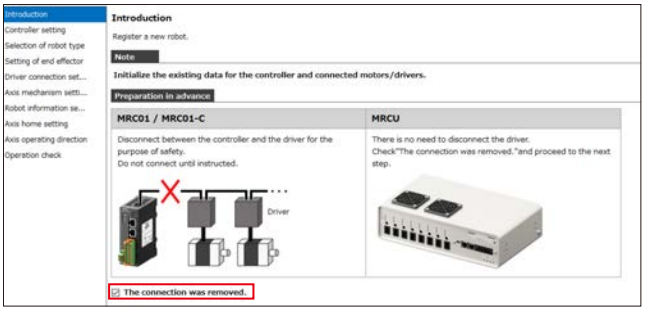


*1 An Oriental Motor cable is used.
*2 The pin number G (frame ground) of the power supply connector is grounded.

Setup

Set the information of the robot with the MRC Studio software.

1. Start the MRC Studio software.
2. Click [Communication port] to select [MRCU].
3. Click [Setup] on the start screen.
4. On the “Introduction” screen, check “The connection was removed.” and proceed to the next screen.



5. Then follow the on-screen instructions to set up.

> **Tip**
>
> To change the robot type, perform the setup again from the start screen. Except for the robot type, using [Re-setup] in the [Maintenance] menu can change even after the setup is completed.

Maintenance

It is recommended that the following items be inspected periodically after each operation of the robot. If any abnormality occurs, stop using the product and contact your nearest Oriental Motor sales office.

Inspection

Inspection Items

- Check to see if the openings in the controller are clogged.
- Check to see if there is no dust adhering to the controller.
- Check to see if the connection part to the controller is loose.
- Check to see if there is any unusual smell or appearance to the controller.

> **Note**
>
> The controller uses semiconductor components. Since static electricity may damage semiconductor components, be extremely careful when handling it.

Warranty

Check on the Oriental Motor Website.

Disposal

Dispose the product correctly in accordance with laws and regulations, or instructions of local governments.

Troubleshooting

Alarms

This controller has an alarm function to protect against temperature rise, poor connection, operating error, and the like.
If an alarm is generated, the ALM-A output is turned ON and the ALM-B output is turned OFF to stop the robot. At this time, the motors remain in an excitation state. At the same time, the ALM LED blinks in red.
The alarm that is being generated can be checked via communication, using the MRC Studio software, or by counting the number of blinks of the ALM LED.
Refer to the USER MANUAL of the MRC01 controller for the alarm list or timing chart.

Alarm reset

Before resetting an alarm, always correct the cause of the alarm and ensure safety, and perform any of the reset operations listed below.

- Turn the ALM-RST input from OFF to ON. (It is enabled at the ON edge.)
- Execute the alarm reset by the maintenance command via communication.
- Execute the alarm reset using the MRC Studio software.
- Turn the power off and on again.

> **Note**
>
> Some alarms can only be reset by turning the power off and on again.

Alarm history

Up to 10 generated alarm items are stored in non-volatile memory in order from most recent to oldest. The stored alarm history can be read or cleared if any of the following operations is performed.

- Read the alarm history with the monitor command via communication.
- Clear the alarm history with the maintenance command via communication.
- Read or clear the alarm history using the MRC Studio software.

Information

The controller is equipped with a function to generate information output before an alarm is generated. This function can be used for periodic maintenance of equipment by setting an appropriate value in the parameter of each information.
Refer to the USER MANUAL for details on the related parameters and information list.

Status when information is generated

Information Bit Output

If information is generated, a bit output (INFO-** output) of the corresponding information is turned ON. A desired output signal can be assigned to the INFO-USRIO output among the bit outputs and used. If the assigned output signal is turned ON, the INFO-USRIO output is also turned ON.

INFO Output

If information is generated, the INFO output is turned ON.

Operation of Robot

The robot continues to operate even while information is being generated, unlike in the case of an alarm. However, in some information, the robot may stop operating when information is generated.

Clearing information

How to clear the information can be set with the “Information auto clear” parameter.

When the “Information auto clear” parameter is set to “1: Enable” (initial value)

The generated information will be automatically cleared if the condition for clearing the information is met.

When the “Information auto clear” parameter is set to “0: Disable”

Even if the condition for clearing the information is met, the information remains generated. The information can be cleared if any of the following is performed in a state where the condition for the clearing information is met.

- Execute the clear information with the maintenance command via communication.
- Execute the clear information on the information monitor of the MRC Studio software.
- Turn the INFO-CLR input ON.
- Turn the power off and on again.

Information history

Up to 16 generated information items are stored in RAM in order from most recent to oldest. The information stored as the information history is the information code, the time of generation, and the information content. The stored information history can be read or cleared if any of the following operations is performed.

- Read the information history with the monitor command via communication.
- Clear the information history with the maintenance command via communication.
- Read or clear the information history using the MRC Studio software.

Tip

The information history is cleared when the power supply of the controller is turned off, as it is stored in RAM.

Cable

Connection cables / Flexible connection cables (for cable type)

These cables are used to connect the manipulator and controller.
Use a flexible cable if the cable is bent, as in the case of an arm.

For AZM14, AZM15, AZM24, AZM26

Length [m (ft.)]	Connection Cable Model	Flexible Connection Cable Model
1 (3.3)	CCM010Z2AAF	CCM010Z2AAR
3 (9.8)	CCM030Z2AAF	CCM030Z2AAR
5 (16.4)	CCM050Z2AAF	CCM050Z2AAR
10 (32.8)	CCM100Z2AAF	CCM100Z2AAR

For AZM46, AZM48, AZM66, AZM69

For motor/encoder connection

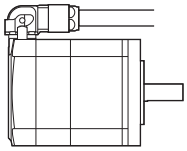
Length [m (ft.)]	Connection Cable Model	Flexible Connection Cable Model
1 (3.3)	CCM010Z2ABF	CCM010Z2ABR
3 (9.8)	CCM030Z2ABF	CCM030Z2ABR
5 (16.4)	CCM050Z2ABF	CCM050Z2ABR
10 (32.8)	CCM100Z2ABF	CCM100Z2ABR

For motor/encoder/electromagnetic brake connection

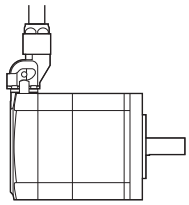
Length [m (ft.)]	Connection Cable Model	Flexible Connection Cable Model
1 (3.3)	CCM010Z2ACF	CCM010Z2ACR
3 (9.8)	CCM030Z2ACF	CCM030Z2ACR
5 (16.4)	CCM050Z2ACF	CCM050Z2ACR
10 (32.8)	CCM100Z2ACF	CCM100Z2ACR

Connection cables / Flexible connection cables (for connector type)

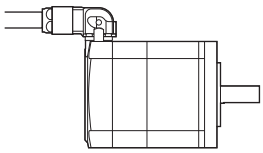
These cables are used to connect the manipulator and controller.
Use a flexible cable if the cable is bent, as in the case of an arm.
The connection cable model varies depending on the direction of the cable outlet from the motor.
Refer to the figures below.



Cable outlet direction
Output shaft side



Cable outlet direction
Vertical side



Cable outlet direction
Opposite to output shaft side

Connection cables

Length [m (ft.)]	Cable outlet direction		
	Output shaft direction	Vertical direction	Opposite to output shaft direction
1 (3.3)	CCM010Z1EFF	CCM010Z1EVF	CCM010Z1EBF
2 (6.6)	CCM020Z1EFF	CCM020Z1EVF	CCM020Z1EBF
3 (9.8)	CCM030Z1EFF	CCM030Z1EVF	CCM030Z1EBF
5 (16.4)	CCM050Z1EFF	CCM050Z1EVF	CCM050Z1EBF
7 (23.0)	CCM070Z1EFF	CCM070Z1EVF	CCM070Z1EBF
10 (32.8)	CCM100Z1EFF	CCM100Z1EVF	CCM100Z1EBF

Flexible connection cables

Length [m (ft.)]	Cable outlet direction		
	Output shaft direction	Vertical direction	Opposite to output shaft direction
1 (3.3)	CCM010Z1EFR	CCM010Z1EVR	CCM010Z1EBR
2 (6.6)	CCM020Z1EFR	CCM020Z1EVR	CCM020Z1EBR
3 (9.8)	CCM030Z1EFR	CCM030Z1EVR	CCM030Z1EBR
5 (16.4)	CCM050Z1EFR	CCM050Z1EVR	CCM050Z1EBR
7 (23.0)	CCM070Z1EFR	CCM070Z1EVR	CCM070Z1EBR
10 (32.8)	CCM100Z1EFR	CCM100Z1EVR	CCM100Z1EBR

Extension cables / Flexible extension cables

These cables are used to add between the controller and the connection cable to extend the wiring distance. They are common to the cable type motor and the connector type motor.
Use a flexible cable if the cable is bent, as in the case of an arm.
When extending the wiring distance by connecting an extension cable to the connection cable, make the total cable length 10 m (32.8 ft.) or less.

Length [m (ft.)]	Extension cable model	Flexible extension cable model
1 (3.3)	CCM010Z2ADFT	CCM010Z2ADRT
3 (9.8)	CCM030Z2ADFT	CCM030Z2ADRT
5 (16.4)	CCM050Z2ADFT	CCM050Z2ADRT

Power supply cable

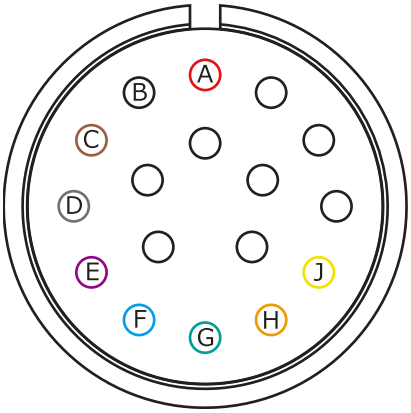
This cable is used when connecting a controller to power supplies.

Model

CC09MRCU030 [3 m (9.8 ft.)]

Pin assignments

The figure shows the view from the insert side of the contacts. Wire all terminals according to the pin assignments in the table.

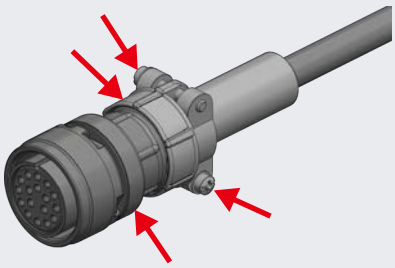


No.	Lead wire color	Name
A	Red	Main power supply 1
B	Black	Ground (For main power supply 1)
C	Brown	Main power supply 2
D	Gray	Ground (For main power supply 2)
E	Purple	Main power supply 3
F	Blue	Ground (For main power supply 3)

No.	Lead wire color	Name
G	Green	Frame ground
H	Orange	Control power supply
J	Yellow	Ground (For control power supply)

Tip

The plug of the cable is assembled with several screws. Check that these screws are not loose before use. Tighten the screws again if they are loose.



I/O signal cables

Keep the cables as short as possible.
Select the cable suitable for the number of I/O signals connected.

Length [m (ft.)]	Number of lead wires			
	6 pieces	10 pieces	12 pieces	16 pieces
0.5 (1.6)	CC06D005B-1	CC10D005B-1	CC12D005B-1	CC16D005B-1
1 (3.3)	CC06D010B-1	CC10D010B-1	CC12D010B-1	CC16D010B-1
1.5 (4.9)	CC06D015B-1	CC10D015B-1	CC12D015B-1	CC16D015B-1
2 (6.6)	CC06D020B-1	CC10D020B-1	CC12D020B-1	CC16D020B-1

Accessory

Relay contact protection parts / circuits

CR circuit for surge suppression

This product is effective in suppressing the surge that occurs in a contact part of the relay. Use it to protect the contacts of the relay or switch.
Model: EPCR1201-2

CR circuit module

This product is effective in suppressing the surge that occurs in a contact part of the relay. Use it to protect the contacts of the relay or switch. Four pieces of CR circuit for surge suppression are mounted on the compact circuit, and this product can be installed to a DIN rail. This product can make the wiring easy and reliable as it also allows terminal block connection.
Model: VCS02

Specifications

Product specifications

For product specifications, contact your nearest Oriental Motor sales office.

General specifications

Operating environment

Ambient temperature: 0 to +40 °C [+32 to 104 °F] (non-freezing)
Humidity: 85 % or less (non-condensing)
Altitude: Up to 1,000 m (3,300 ft.) above sea level
Atmosphere: No corrosive gas or dust. No exposure to water or oil.

Storage environment and shipping environment

Ambient temperature: -25 to +70 °C [-13 to +158 °F] (non-freezing)
Humidity: 85 % or less (non-condensing)
Altitude: Up to 3,000 m (10,000 ft.) above sea level
Atmosphere: No corrosive gas or dust. No exposure to water or oil.

Regulations and standards

EU Machinery Directive

The manipulator, motorized actuator, and controller have been designed and manufactured to be incorporated into general industrial equipment, and a Declaration of Incorporation of Partly Completed Machinery is issued with them according to the EU Machinery Directive.

Series	Model*	Applicable standards
OVR	OVR30□K■-H OVR40□K5-V OVR5048K1-V OVR6048K1-V	EN ISO 12100 EN ISO 10218-1
EL	EL6 EL12	EN ISO 12100

* The box (□) in the model indicates a number representing the reach. The box (■) in the model indicates a number representing the payload.

CE Marking

This product is affixed with the marks under the following directives.

EU EMC Directive

Refer to "Compliance with the EMC Directive" on page 30 for details about conformity.

EU RoHS Directive

This product does not contain the substances exceeding the restriction values.

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Published in September 2026

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