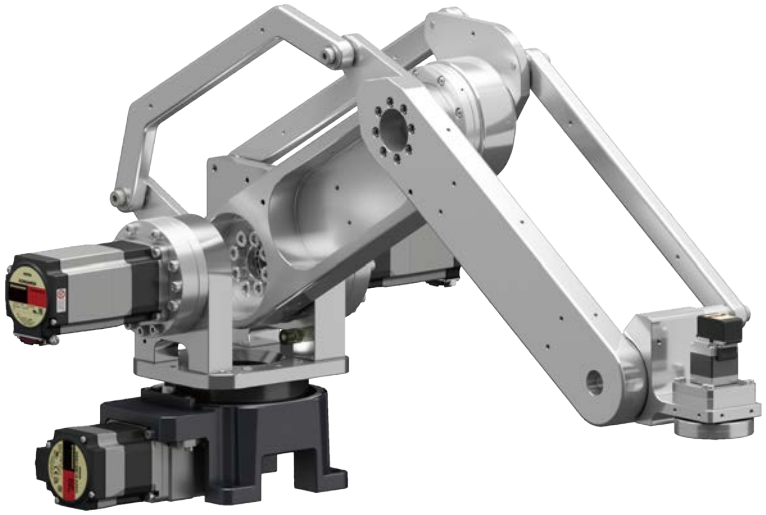
Oriental motor

Small Robots OVR 4-Axis Articulated Operating Manual

WM-0002-3E



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.

- Only qualified personnel of electrical and mechanical engineering should work with the product.
- The product described in this manual is designed and manufactured to be incorporated into general industrial equipment. Do not use it for any other purpose. Oriental Motor Co., Ltd. is not responsible for any compensation for damage caused through failure to observe this warning.
- Read the section "Safety precautions" on page 4 thoroughly before using the product. In addition, be sure to observe the contents described in warning, caution, and note in this manual.

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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 robot, 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 robot 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.
- Do not allow your hands to be caught in moving parts of the product. Doing so may result in injury or damage to equipment.
- 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 any components other than those specified for the motor replacement work. Also, do not modify the product. Doing so may result in injury or damage to equipment.
- Do not install, connect, or inspect/troubleshoot the product while the power is on. When working with the power on state, provide work rules in accordance with the Ordinance on Industrial Safety and Health and take appropriate safety measures. Failure to do so may result in fire, injury, or damage to equipment.

Installation and wiring

- When transporting or installing the product, wear a helmet, safety shoes, gloves, or other protective equipment to hold the specified places. Failure to do so may result in injury.
- Be sure to secure the product itself according to the instructions. Failure to do so may result in injury or damage to equipment.
- Be sure to wire and connect according to the instructions. Failure to do so may result in fire or damage to equipment.
- Do not pull the cable and connector, apply excessive force to them, or step on them. Also, do not excessively bend the cable. Doing so may result in injury or damage to equipment.
- Depending on the operating environment, the cable between the product and the controller may be damaged or deteriorated. Therefore, protect the cable with a protective tube or cover as necessary. Failure to do so may result in injury or damage to equipment.

- Make sure that two or more people work together to perform the necessary tasks when installing the product. Also, when working with two or more people, clarify the relationship and roles of the primary worker and assistant worker, while communicating with each other to ensure safety. Failure to do so may result in injury.
- Install an external fuse, if necessary, to prevent ignition due to a large amount of current flowing from the power supply side.

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.
- When turning on the driver power, make sure there is no signal input from the host controller. The product may start operating unintentionally, causing injury or damage to equipment.
- Turn off the power supply of the driver in the event of a power failure. Otherwise, the product may start suddenly when the power is restored, causing injury or damage to equipment.
- If any abnormality is observed, immediately stop operation and turn off the power to the motor that drives the product. Failure to do so may result in 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.
- When operating the product after the driver power supply is turned on or the power to the motor is turned off, adjust the position at low speed to ensure safety. Failure to do so may result in injury or damage to equipment.

Maintenance and inspection

- Perform the pre-work (daily) inspection and periodic inspection according to the instructions in this manual, and check that there are no abnormalities in the product and related equipment before working. Failure to do so may result in injury or damage to equipment.
- If it is necessary to replace the motor for maintenance, contact your nearest sales office.

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.

- When conducting the insulation resistance measurement or the dielectric strength test, be sure to separate the connection between the product and the driver. Failure to do so may result in damage to equipment.
- Take measures against static electricity when handling. Static electricity may cause the encoder (ABZO sensor) of the motor that drives the product or the driver to malfunction or be damaged. This may result in injury or damage to equipment.
- Stop operation if abnormal noise or vibration occurs during operation. Failure to do so may result 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 or driver to the surrounding control system equipment and Electromagnetic Susceptibility (EMS) generated by the product or driver, the function of your equipment may be seriously affected. Verify EMC compliance with the completed equipment. This may result in injury or damage to equipment.
- Since the motor surface temperature may exceed 70 °C (158 °F) even under normal operating conditions, if the operator is allowed to approach the motor, affix a warning label shown in the figure on a conspicuous place. The surface is hot, and this may cause a skin burn(s).

- Use a driver and cable that are connected to the motor only in the specified combination. Failure to do so may result in fire, injury, or damage to equipment.
- Keep the encoder (ABZO sensor) of the motor away from a strong magnetic field. This may damage to the encoder (ABZO sensor) or cause the product to malfunction. Injury or damage to equipment may result.
- To protect the encoder (ABZO sensor), use the motor in a condition where the motor surface temperature does not exceed 80 °C (176 °F). Failure to do so may result in damage to equipment.
- Make sure not to apply a strong shock to the encoder (ABZO sensor) of the motor. This may damage to the encoder (ABZO sensor) and cause the product to malfunction, resulting in damage to the equipment. The label shown in the figure is affixed on the motor.

- Be careful not to make any mistakes in the combinations when connecting a motor and a driver. Wiring in the wrong combination may cause unexpected movement. This may result in injury or damage to equipment.
- The status of the actuating controls shall be clearly indicated, e.g. power on, fault detected, automatic operation. If an indicator light is used, it shall be suitable for its installed location and its color shall meet the requirement of IEC 60204-1.

- Be careful not to get your fingers caught in the stoppers that limit the movement of the L-axis (M2: lower arm) and U-axis (M3: upper arm) of the product. This may result in injury. The label shown in the figure is affixed on the stopper part.

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.

- Robot ..... 1 unit
- Positioning pin for origin setting ..... 1 piece
- Unpacking procedure ..... 1 copy

How to identify the product model

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

OVR	4	068	K	5	-	V
	1	2	3	4		5

1	Number of axes	4: 4 axes
2	Reach	048: 480 mm (18.90 in.) 068: 680 mm (26.77 in.) 088: 880 mm (34.65 in.)
3	Power supply specification	K: 24 VDC
4	Transportable mass	5: 5 kg (11 lb.)
5	Robot type	V: Articulated

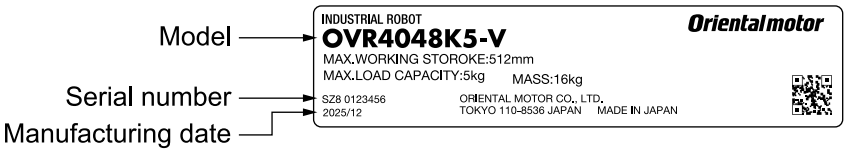
Driver and controller that can be combined

Product	Series	Type	Model
Driver	AZ Series	Built-in controller type	AZD-KD
		mini Driver RS-485 communication type	AZD-KR2D
Controller	MRCU Series	–	MRCU4AK MRCU5AK MRCU6AK MRCU7AK MRCU8AK

Information about nameplate

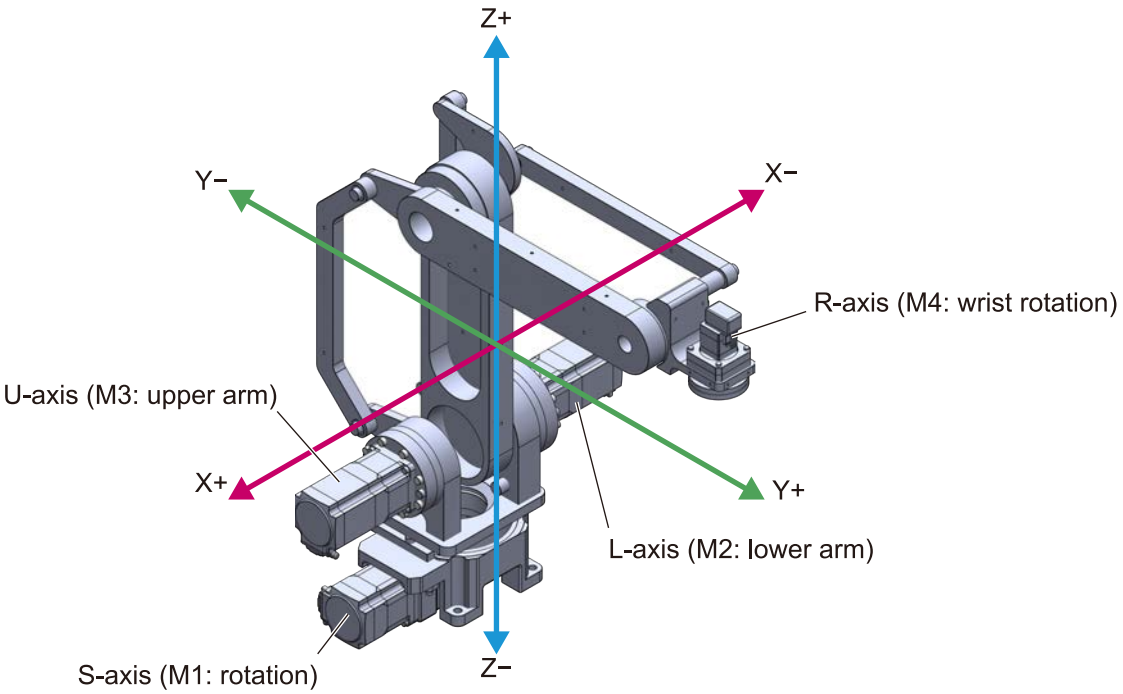
The figure shows an example.

> **Tip**
>
> The position describing the information may vary depending on the product.



Names of parts

The product consists of four axes: S-axis (M1: rotation), L-axis (M2: lower arm), U-axis (M3: upper arm), and R-axis (M4: wrist rotation).
All motors are of the AZ Series equipped with a battery-free absolute encoder (ABZO sensor).
The motors that drive the L-axis (M2: lower arm) and U-axis (M3: upper arm) are equipped with a power-off activated type electromagnetic brake. If the power supply to the product is shut off due to an emergency stop, the positions of the axes will be maintained.
There is no mechanism to hold the S-axis (M1: rotation) and the R-axis (M4: wrist rotation). If the power supply to the product is shut off due to an emergency stop, the axes can be moved manually.

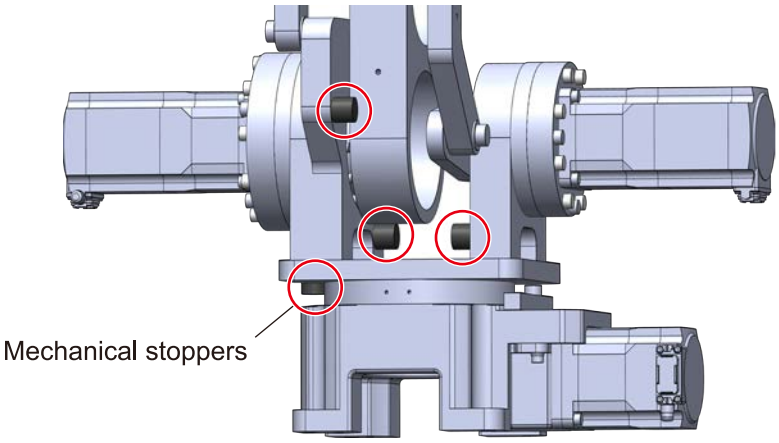


Axis	Drive name	Model
S axis	M1	DGB130R36-AZAKHL*
L axis	M2	AZM66MKH-CSG25-100
U axis	M3	AZM66MKH-CSG20-100
R axis	M4	AZM24AK-CSF8-50

* Contact your nearest Oriental Motor sales office to purchase the product.

Rotation limit mechanical stopper

This product is equipped with mechanical stoppers that limit the movable range.



Note

The rotation limit mechanical stoppers are not intended to protect the axis (axes) from falling. Check to ensure safety to use.

Installation of robot

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:

- Inside an enclosure installed indoors (provide ventilation holes)
- Operating ambient temperature: 0 to +40 °C [+32 to 104 °F] (non-freezing)
- Operating ambient humidity: 85 % or less (non-condensing)
- 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

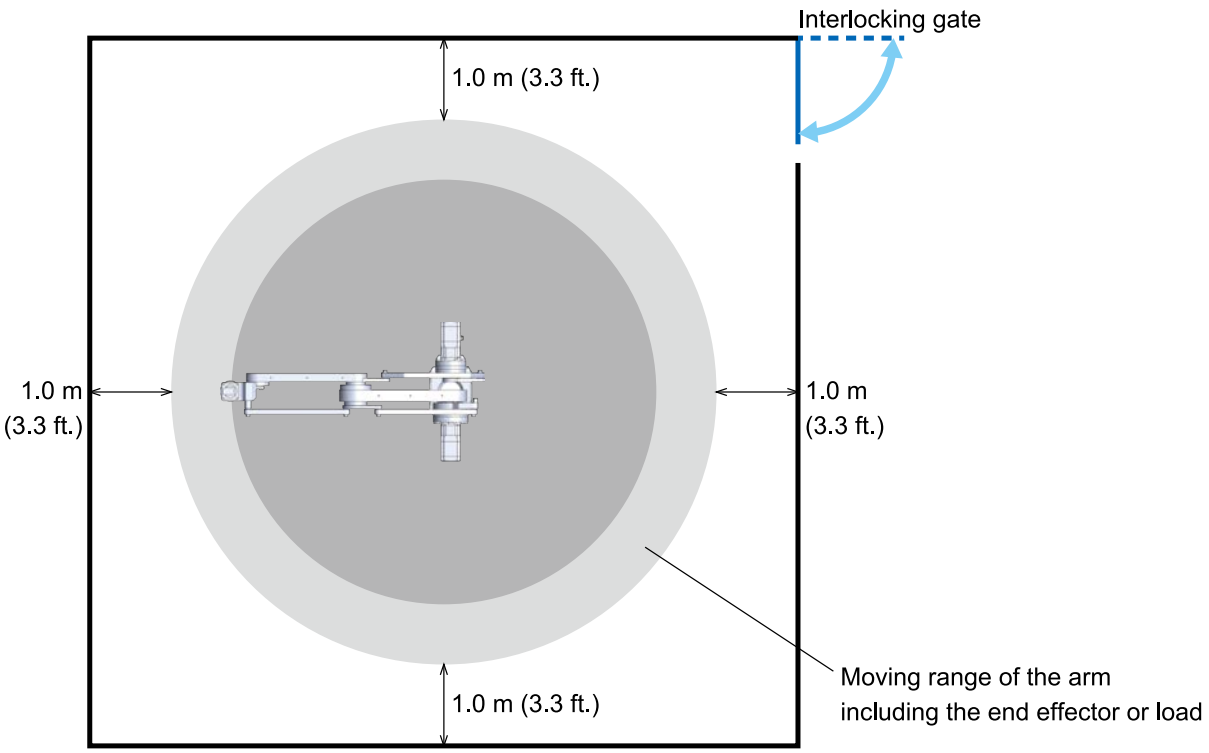
Safety cage

- Install a safety cage around the robot to prevent interference with surrounding equipment, even when the arm reaches the maximum operating range with the end effector or load attached.
- The number of entrances and exits to the safety cage should be minimized (one as much as possible), and an interlocking gate should be provided.
- Be sure to observe the requirements of EN ISO 14120, EN ISO 13857, EN ISO 13854, and EN ISO 14119 when installing a safety cage.

Installation example of a safety cage

The horizontal safety distance between the robot and the safety cage varies depending on the height of the safety cage.
The figure shows the horizontal safety distance under the following conditions.

- The results of the risk assessment are corresponded to the low risk specified in EN ISO 13857 (unrecoverable, or not foreseeable as resulting in injuries requiring a long period of recovery).
- The hight of the safety cage is 1.2 m (3.9 ft.).
- The hight that includes the end effector and load is 1.4 m (4.6 ft.).



Unpacking method

1. Place the package on a horizontal, flat surface to unpack.
   The product is not in a fixed state in the package. Be careful when handling the product as it may tilt.
2. Hold the gear sections of the L-axis (M2: lower arm) and U-axis (M3: upper arm) with both hands and take out the product.
   When removing, be sure to use both hands to hold the specified positions. Improper holding, such as holding the product with one hand or in a position other than that specified, may cause the axis to move in an unexpected direction, resulting in a fall or injury.

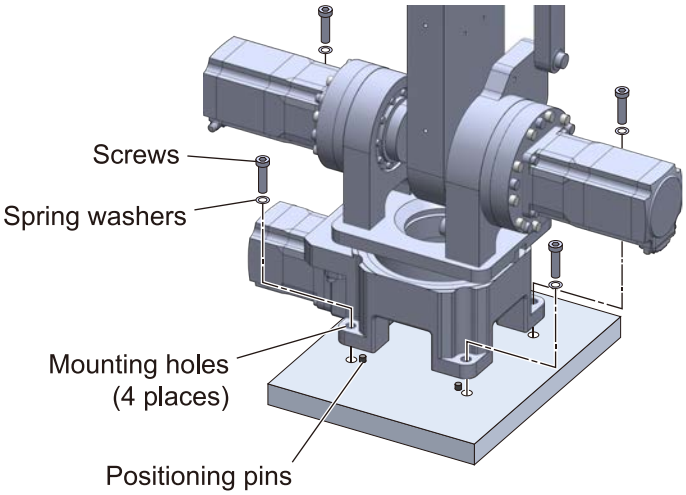
3. Place the product in the installation place and remove the packing materials.

Installation method

Note

- Ensure that there is sufficient work space at the installation site so that teaching and maintenance/inspection can be performed safely.
- Do not loosen or remove any screws on the product. This may result in reduced positioning accuracy or damage to the product.
- Work in a stable condition so that the product does not tilt.
- Install the product on a metal surface of sufficient strength to prevent vibration or twisting of an enclosure in which the product is installed.

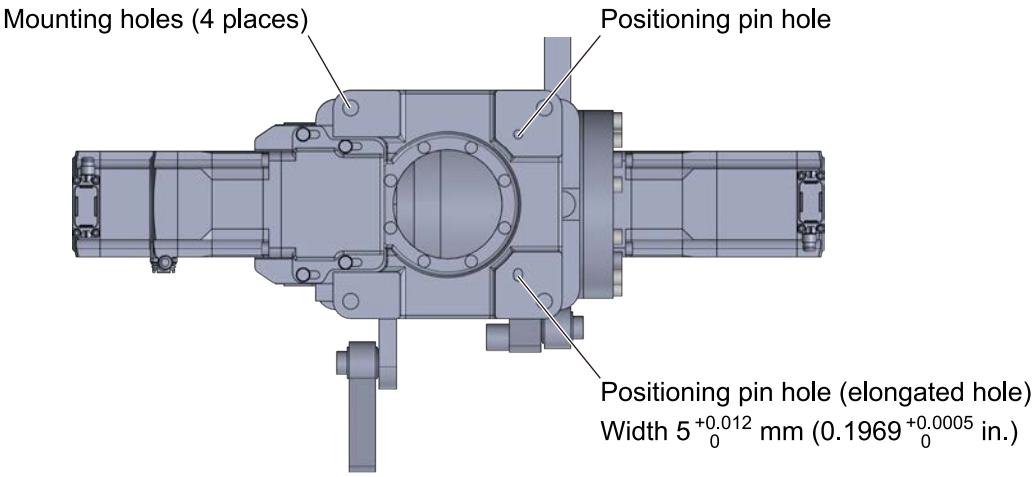
This section uses OVR4048 as an example to explain.
Use four mounting holes of the S-axis (M1: rotation) to secure the product to the mounting plate.
Provide screw holes in the mounting plate.
When positioning the product, use two positioning pin holes.



Screws, spring washers, positioning pins are to be provided by the customer.
The values of the tightening torque are recommended. Tighten the screws to an appropriate torque according to the design conditions of the mounting plate.

Mounting plate	Thickness: 10 mm (0.39 in.) or more Material: Steel
Mounting hole	Hole diameter: φ9 mm (φ0.35 in.) Nominal designation of thread: M8 Tightening torque: 13 N·m (115 lb-in)
Positioning pin hole	Pin hole diameter: $\varphi 5_{0}^{+0.012}$ mm ($\varphi 0.1969_{0}^{+0.0005}$ in.) Pin hole depth: 5 mm (0.20 in.), blind hole

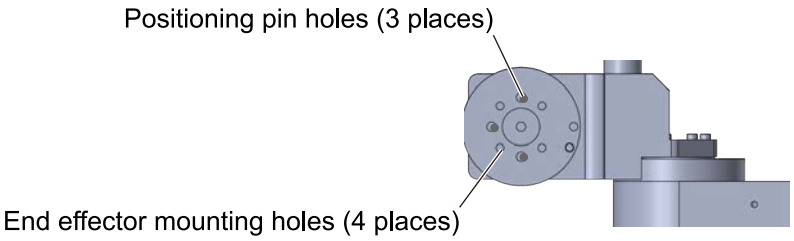
Figure viewed from the installation surface side



Installation of the end effector

Use four end effector mounting holes of the R-axis (M4: wrist rotation) to install the end effector with screws.
Use three positioning pin holes of the R-axis (M4: wrist rotation) when positioning the end effector.
The values of the tightening torque are recommended. Tighten the screws to an appropriate torque according to the design conditions of the end effector.

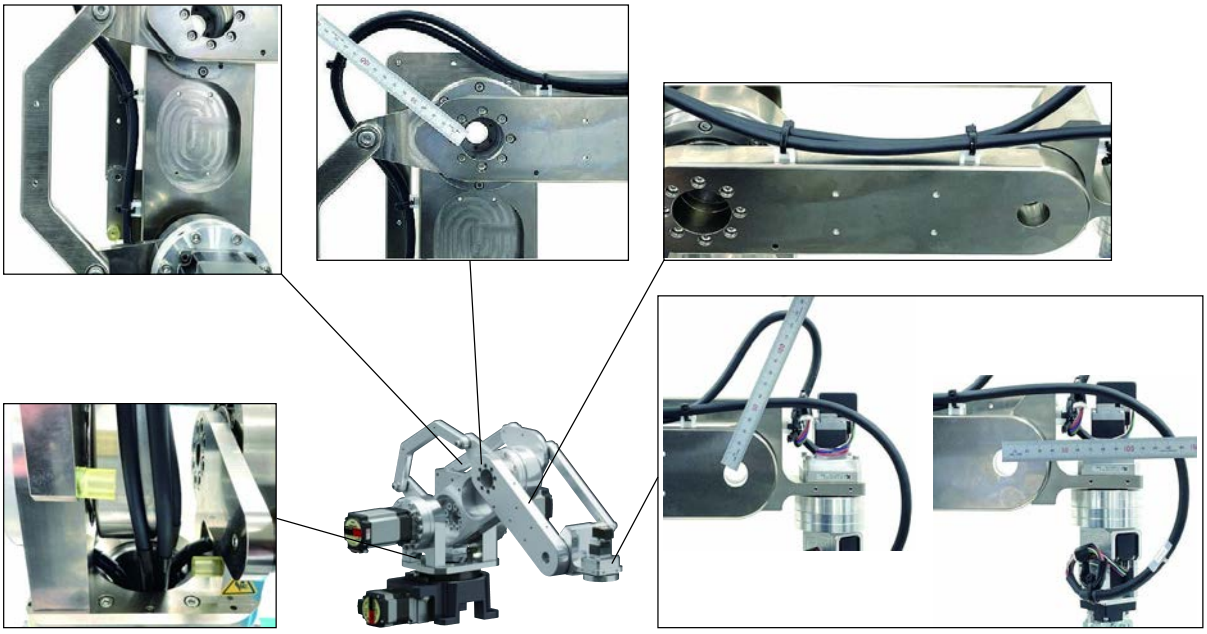
End effector	Material: Steel or aluminum
Mounting hole	Nominal designation of thread: M5 Tightening torque: 5 N·m (710 oz-in) Effective depth of screw: 6.5 mm (0.26 in.)
Positioning pin hole	Pin hole diameter: $\varphi 5^{+0.012}_{0}$ mm ($\varphi 0.1969^{+0.0005}_{0}$ in.) Pin hole depth: 6.5 mm (0.26 in.)



ISO 9409-1-31.5-4-M5 Compliant

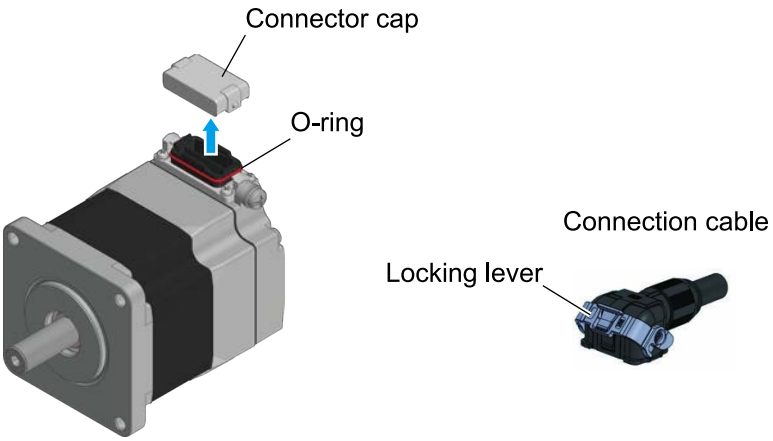
Wiring example

- Secure the cables near the connectors to prevent stress at each connection point of the connectors and cables.
- Make sure to wire the cable providing a looseness so that no stress is applied to it.
- Maintain 10 m (32.8 ft.) or less for the total wiring distance of the cable.



Connection of the connector type motor

The motors for M1 to M3 are those that the cable connection method is the connector type. Connect according to the following method.

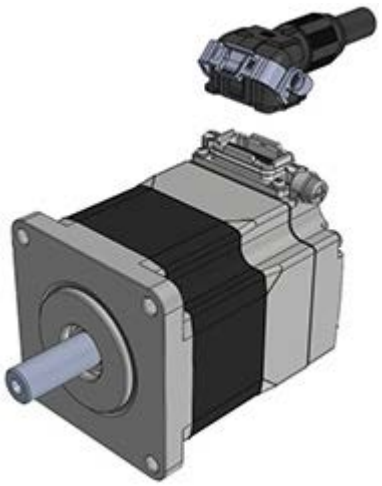


1. Remove the connector cap.

   Note

   Do not damage the O-ring of the connector when removing the connector cap.

2. Check the position of the connector terminals and connect the connector of the connection cable.
   The figure shows an example where the cable outlet direction is opposite to the output shaft direction.



   Note

   If the locking lever is in a state of being turned up to the 90-degree position or down to the 0-degree position, parts around the locking lever and the connector are in contact with each other, and the connectors cannot be connected.

Locking lever is in 90-degree position	Locking lever is in 0-degree position
	

3. Turn the locking lever down to the 0-degree position to fix the connector.

Handling of locking lever

- Do not apply excessive force to the locking lever. If the locking lever is damaged, the connector may not be fixed securely.
- After connecting the connector, turn the locking lever down securely to the 0-degree position to fix the connector.

⚠ WARNING

Be sure to turn down the locking lever. If the connector is not fixed, the cable may come off, resulting in fire, electric shock, or damage to equipment.

Removing the cable

Turn up the locking lever and pull out the connector.

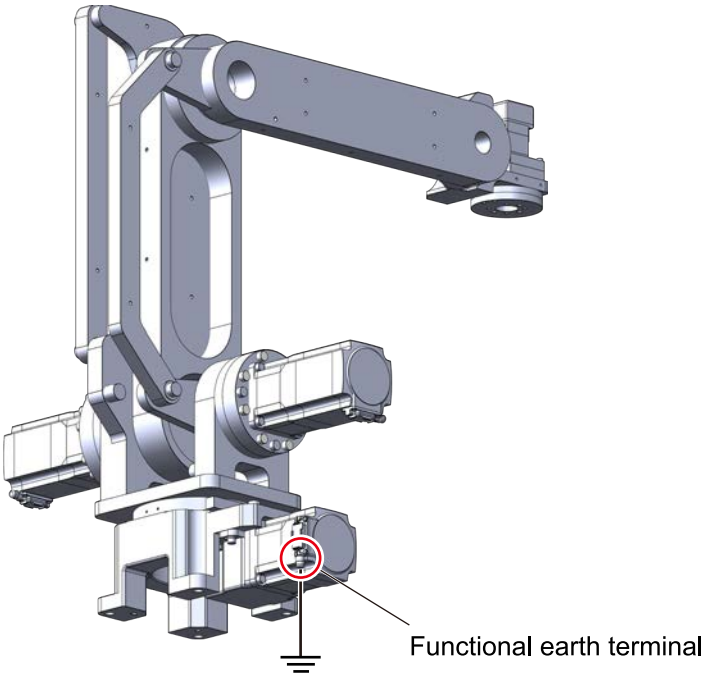
Tip

Turning up the locking lever to the 90-degree position simultaneously disconnects the connector.

Grounding

Ground the functional earth terminal if necessary.
Use a round terminal when grounding, and be sure to secure it with a screw and washer. A grounding wire and a crimp terminal are not included.

- Conductor size: AWG18 (0.75 mm^2) or thicker wire
- Screw size of functional earth terminal: M4
- Tightening torque: 1.2 N·m (170 oz-in)



Setup

⚠ WARNING

- Always check that the axis movement shown on the screen of the MRC Studio software matches the actual axis movement during setup. If the actual axis movement does not match what is shown on the MRC Studio screen, the product may operate unintentionally, causing injury or damage to equipment.
- When inserting a positioning pin for origin setting, shut off the main power supply of the product. Performing work on the product while the main power supply is turned on may result in injury if the product malfunctions.

About setup

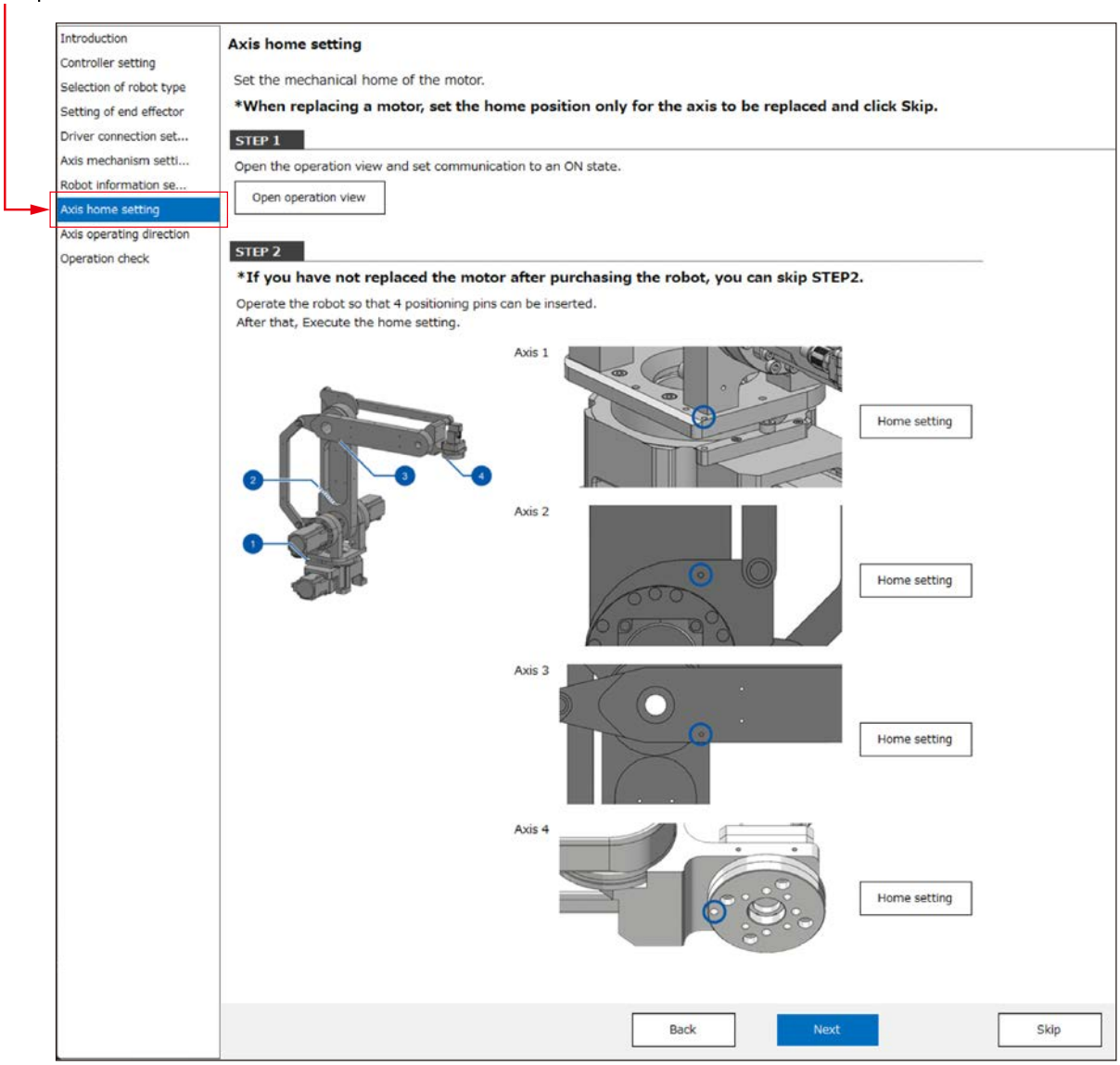
⚠ WARNING

The version of MRC Studio software to be used for the OVR4088K5-V varies depending on the manufacturing date of the robot. Use the robot and the MRC Studio software only in the specified combination. If the wrong version of MRC Studio software is used, the S-axis (M1: rotation) will move in the opposite direction to the set direction, which may result in injury or damage to equipment. The manufacturing date can be checked on the nameplate of the robot.

- Manufactured before February 2025: MRC Studio software version 4.3.0.0 or earlier.
- Manufactured after March 2025: MRC Studio software version 5.0.0.0 or later

- The origin of each axis for the product is set at the time of factory shipment. Therefore, “Axis home setting” is not required for the first-time setup. Click “Skip” and check the next setting item.

Skip to the next item.



- The motor of each axis can be replaced. For details, contact your nearest sales office.
- After replacing the motor, the setup of each axis is required.

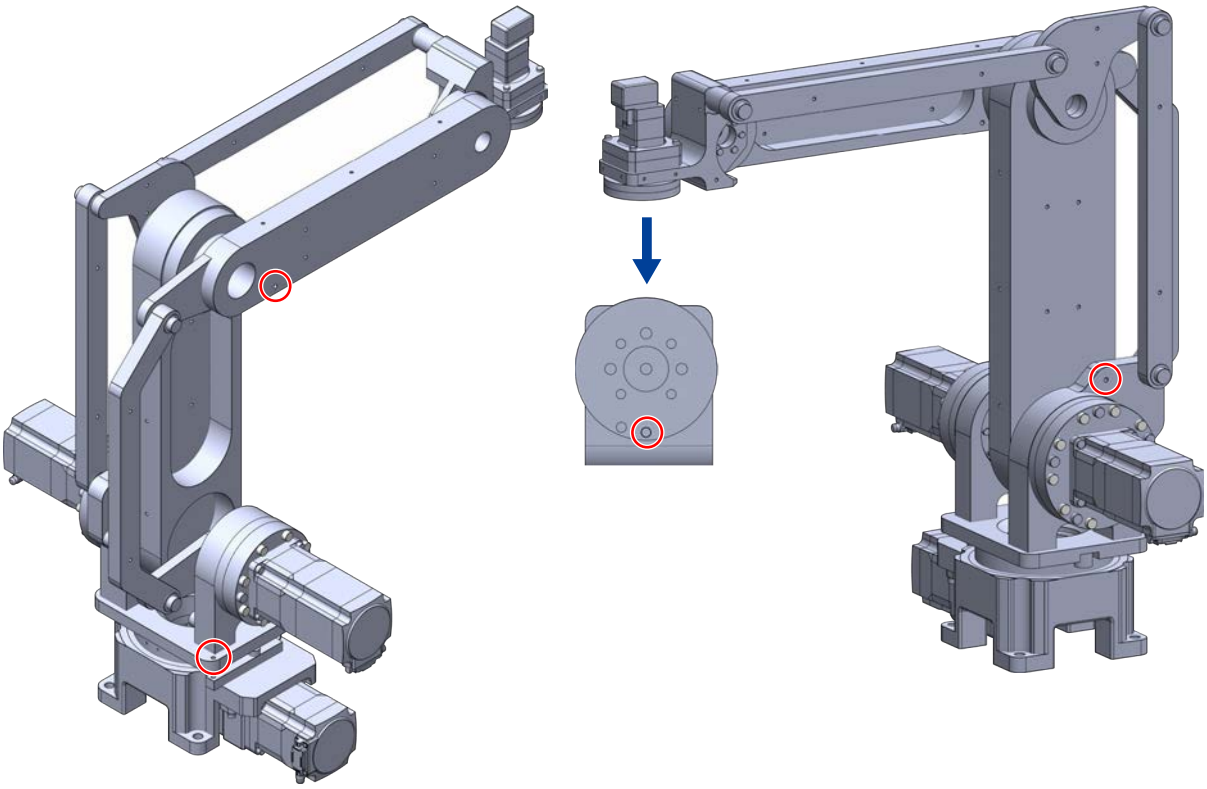
Setup method

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

1. Start the MRC Studio software.
2. Click [Communication port], select a connected controller.
3. Click [Setup] on the start screen.
4. Set the robot type and the mechanism information according to the instructions on the screen.

Origin posture at setup

This product provides four positioning pin holes for origin setting. The position where the included positioning pin can be inserted will be the origin of the axis.
Move the axis to a position where the positioning pin for origin setting can be inserted and set the origin of the axis.
Pin hole diameter: $\varphi 4_{0}^{+0.012}$ mm ($\varphi 0.1575_{0}^{+0.0005}$ in.)

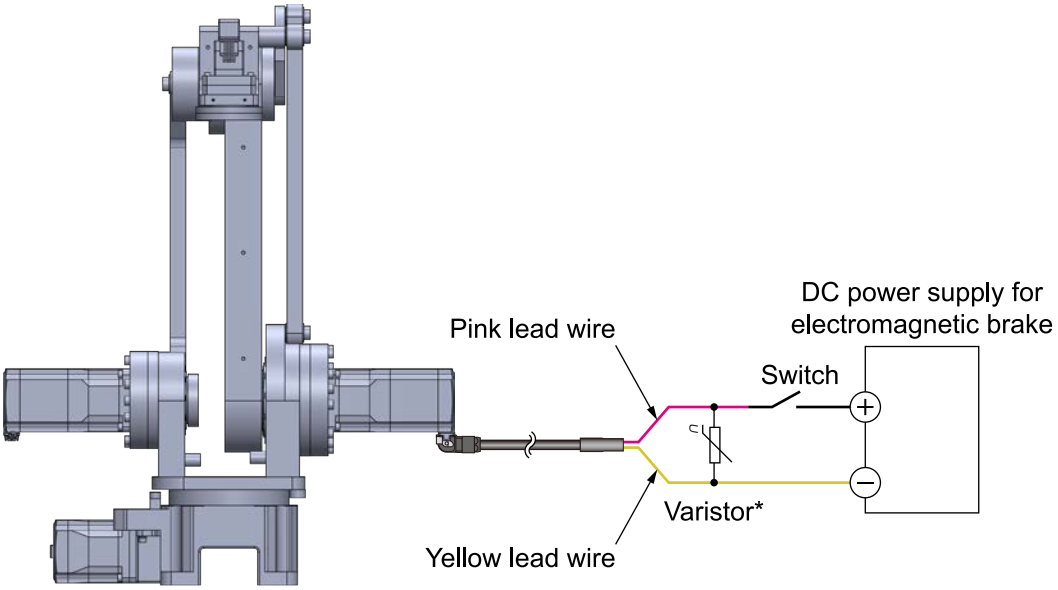


When the power supply is shut off, the electromagnetic brake is activated, and the arm is in a state where it cannot be moved.
When moving the arm while the power supply is shut off, click here.

Releasing the electromagnetic brake

When connecting to the AZ Series built-in controller type driver (AZD-KD)

The electromagnetic brake can be released when the cable for electromagnetic brake of the motor is connected to the DC power supply for the electromagnetic brake.



* Provide a varistor to protect the contact of the switch or to prevent electrical noise. [Recommended varistor: Z15D121 (SEMITEC Corporation)].

Specifications of a power supply for electromagnetic brake

Power supply voltage: 24 VDC±5 %
Power supply current capacity: 0.25 A or more

> **Tip**
>
> The axes on which the electromagnetic brake can be released are the L-axis (M2) and the U-axis (M3).

When connecting to the AZ Series mini Driver (AZD-KR2D) or the MRCU Series controller

The electromagnetic brake cannot be released because the motor cannot be connected directly to the DC power supply.
To release the electromagnetic brake, contact your nearest sales office.

Maintenance

Assign qualified personnel with sufficient knowledge and experience to perform daily and periodic inspections in accordance with the “Safety precautions” section.
Be sure to perform these inspections in order to prevent malfunctions in advance and to ensure safety, and check that there are no abnormalities in the product and related equipment before operation. If any abnormality is found, discontinue use immediately and take necessary action, such as repair.

Inspection

Time for inspection

Perform maintenance for each time period shown in the table when operating eight hours per day. Shorten the maintenance cycle depending on the situation when the product is operated continuously day and night or when the operating rate is high.

Time for maintenance	Inspection	Cleaning
When started	✓	–
Six months after starting operation	✓	–
Every six months thereafter	✓	–
As needed	–	✓

Inspection items

- Check to see if the position securing the product is loose.
- Check to see if any of the screws securing the end effector are loose.
- Check to see if the cable is damaged, scraped or stressed.
- Check to see if the connection between the motor and driver is loose.
- Before and after the power is turned on, check to see if there is any abnormal noise or vibration coming from the bearing or gears.
- Check to see if the operating point has shifted during return-to-home operation and normal operation (original program operation).

Note

- Enter the inspection results and any special comments on the daily checklist when the inspection is performed.
- Perform the inspection outside of the movable range as much as possible.
- If the product has been repaired as a result of the inspection, keep a record of the contents for at least three years.

Tip

Replace the cable if it is worn out as a result of inspection.

Cleaning

- Wipe off dirt with a soft cloth. If it is very dirty, wipe with a soft cloth with neutral detergent.
- Do not blow with compressed air. Dust may enter through the gap.
- Do not use petroleum-based solvents as they may damage the painted surface.

Warranty

Check on the Oriental Motor Website for the product warranty.

Disposal

Dispose the product correctly in accordance with laws and regulations, or instructions of local governments.
When removing the motor or actuator for disposal, remove the screws carefully to prevent injury from falling parts.

Specifications

Product specifications

Check on the Oriental Motor Website for the product specifications.

General specifications

Degree of protection

IP40 (Excluding the connector part)

Noise level

70 dB or less

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: –20 to +60 °C [–4 to +140 °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 robot 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.
Applicable Standards: EN ISO 12100, EN ISO 10218-1

Hazardous substances

This product does not contain substances that exceed the restriction values of the RoHS Directive.

Accessories

Wrist bending axis mounting bracket

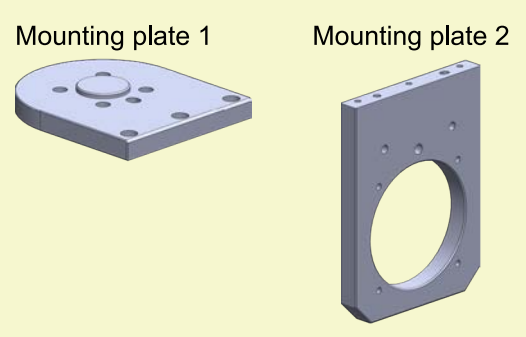
The tip of the arm is always kept horizontal because the 4-axis articulated robot adopts a parallel link mechanism.
When the tip of the arm needs to move in the vertical direction depending on the application of the robot, use the wrist bending axis mounting bracket.
The AZ Series motor and electric gripper can be installed to the wrist bending axis mounting bracket.

Products that can be installed

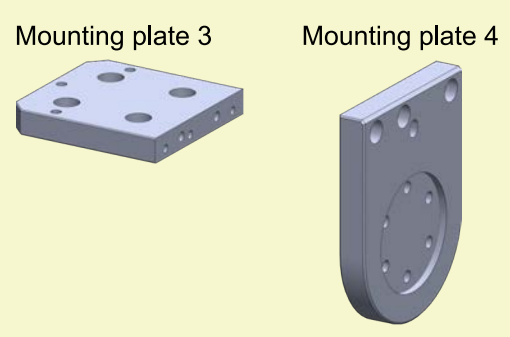
Model	Electric gripper	Motor
P3B1	EH3-AZAKH	AZM24AK-CSF8-50
P3B2	EH4-AZAKH EH4T-AZAKH	AZM24AK-CSF8-50

Component parts

Motor mounting bracket



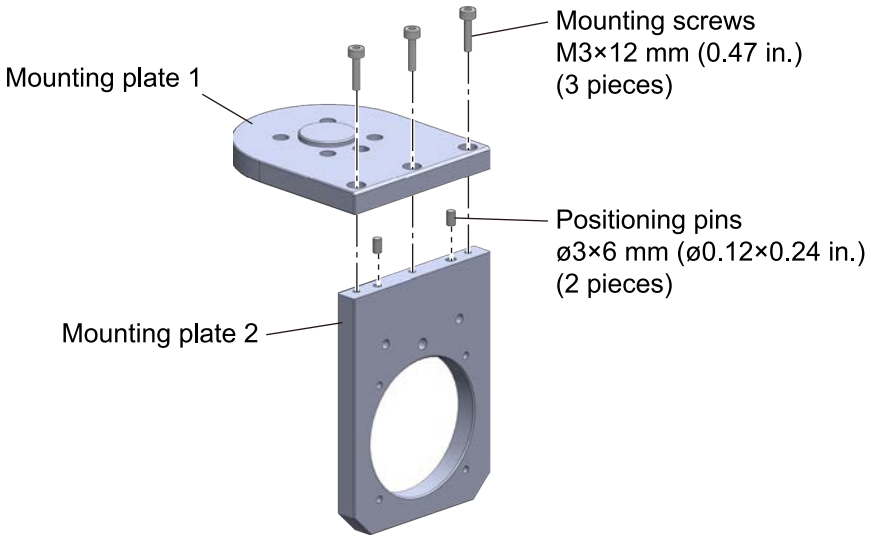
Electric gripper mounting bracket



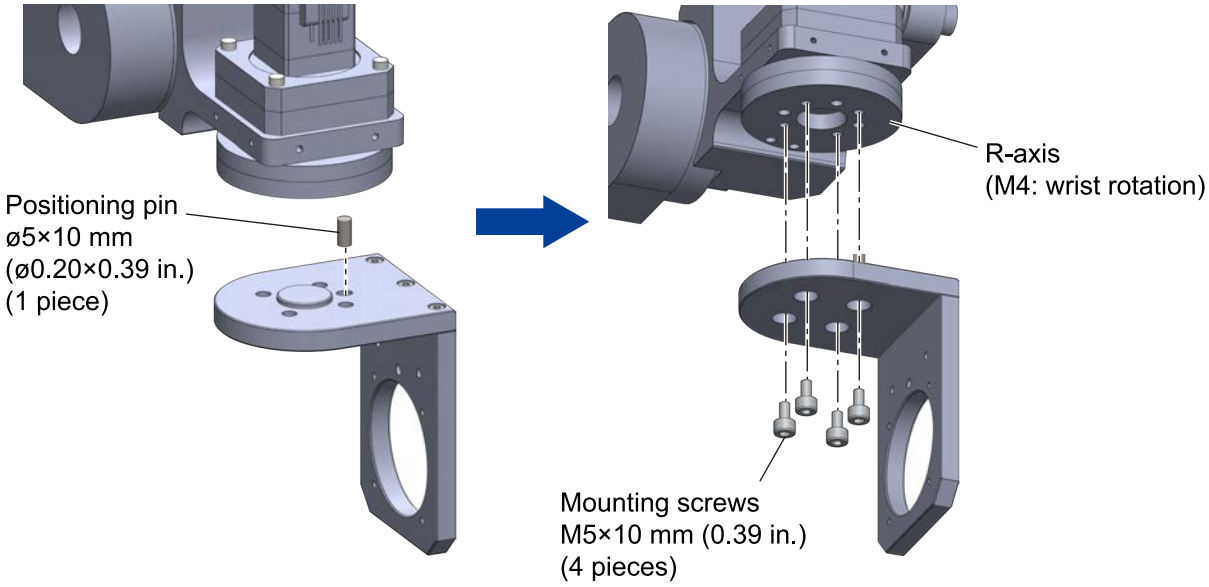
Model	Included	
	Mounting screw	Positioning pin
P3B1	M3×8 mm (0.31 in.) (10 pieces) M3×12 mm (0.47 in.) (6 pieces) M3×25 mm (0.98 in.) (4 pieces) M5×10 mm (0.39 in.) (4 pieces)	φ3×6 mm (φ0.12×0.24 in.) (6 pieces) φ5×10 mm (φ0.20×0.39 in.) (1 piece) φ6×8 mm (φ0.24×0.31 in.) (1 piece)
P3B2	M3×8 mm (0.31 in.) (6 pieces) M3×12 mm (0.47 in.) (6 pieces) M3×25 mm (0.98 in.) (4 pieces) M4×8 mm (0.31 in.) (4 pieces) M5×10 mm (0.39 in.) (4 pieces)	φ3×6 mm (φ0.12×0.24 in.) (6 pieces) φ5×10 mm (φ0.20×0.39 in.) (1 piece) φ10×8 mm (φ0.39×0.31 in.) (1 piece)

Mounting method

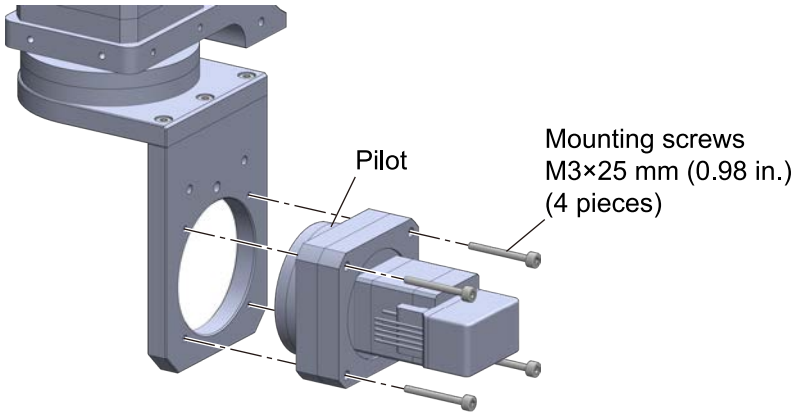
1. Use the mounting plates 1 and 2 to assemble the motor mounting bracket.
   Tightening torque: 1 N·m (142 oz-in)



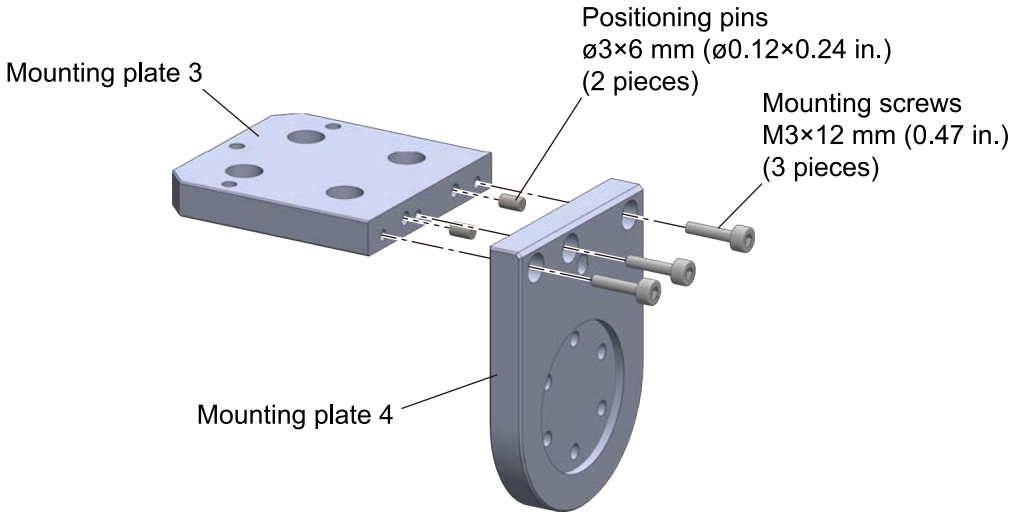
2. Secure the motor mounting bracket to the R-axis (M4: wrist rotation).
   Tightening torque: 2.5 N·m (350 oz-in)



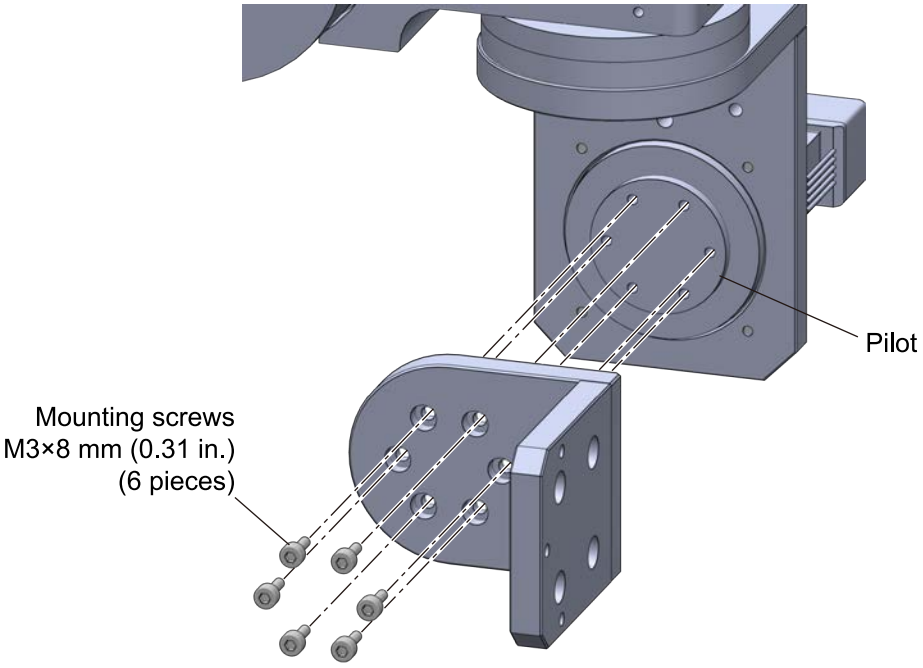
3. Use the pilot of the motor as a guide to secure the motor to the motor mounting bracket.
   Tightening torque: 1 N·m (142 oz-in)



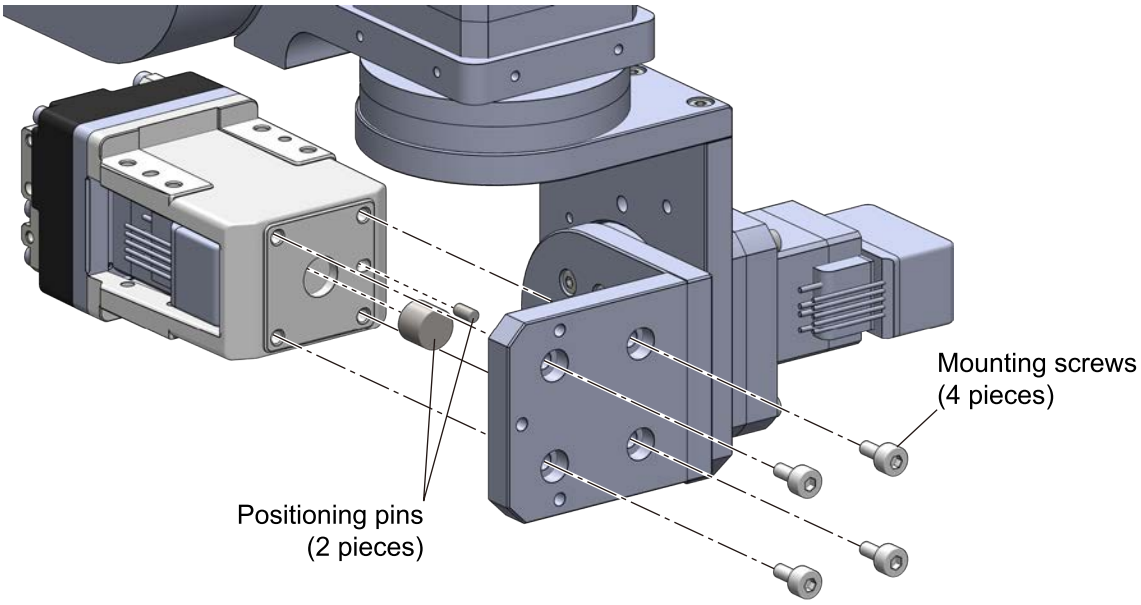
4. Use the mounting plates 3 and 4 to assemble the electric gripper mounting bracket.
   Tightening torque: 1 N·m (142 oz-in)



5. Use the pilot of the motor as a guide to secure the motor to the electric gripper mounting bracket.
   Mounting screws: M3×8 mm (0.31 in.) (6 pieces)
   Tightening torque: 1 N·m (142 oz-in)



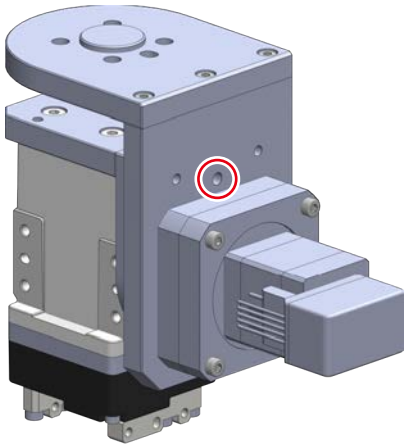
6. Secure the electric gripper to the electric gripper mounting bracket.



Model of wrist bending axis mounting bracket	P3B1	P3B2
Mounting screw	Screw size: M3×8 mm (0.31 in.) Tightening torque: 1 N·m (142 oz-in)	Screw size: M4×8 mm (0.31 in.) Tightening torque: 2 N·m (280 oz-in)
Positioning pin	φ3×6 mm (φ0.12×0.24 in.) φ6×8 mm (φ0.24×0.31 in.)	φ3×6 mm (φ0.12×0.24 in.) φ10×8 mm (φ0.39×0.31 in.)

Origin posture at setup

The mounting bracket provides a positioning pin hole for origin setting. The position where the included positioning pin can be inserted will be the origin of the axis.
Move the axis to a position where the positioning pin for origin setting can be inserted and set the origin of the axis.
Pin hole diameter: $\varphi 4_{0}^{+0.012}$ mm ($\varphi 0.1575_{0}^{+0.0005}$ in.)



Appendix

Stopping distance and stop time

OVR4048K5-V

The following table shows the stopping distance and stop time for each axis when the main power supply is shut off due to an emergency stop while the product operates under the conditions listed below. (Stop category 0)

- Move 500 mm (19.69 in.) in the Y-axis direction with linear interpolation operation
- Operating speed: 1,000 mm/s
- Load mass: 1 kg (2.2 lb.)

Axis	Stopping distance [deg]	Stop time [ms]
S-axis (M1)	38.25	608
L-axis (M2)	6.07	
U-axis (M3)	–6.21	
R-axis (M4)	–36.63	

Data for the stopping distance and stop time is depend on Oriental Motor’s measurement conditions.

OVR4068K5-V

The following table shows the stopping distance and stop time for each axis when the main power supply is shut off due to an emergency stop while the product operates under the conditions listed below. (Stop category 0)

- Move 600 mm (23.62 in.) in the Y-axis direction with linear interpolation operation
- Operating speed: 1,000 mm/s
- Load mass: 1 kg (2.2 lb.)

Axis	Stopping distance [deg]	Stop time [ms]
S-axis (M1)	32.13	904
L-axis (M2)	9.95	
U-axis (M3)	–8.11	
R-axis (M4)	–28.13	

Data for the stopping distance and stop time is depend on Oriental Motor’s measurement conditions.

OVR4088K5-V

The following table shows the stopping distance and stop time for each axis when the main power supply is shut off due to an emergency stop while the product operates under the conditions listed below. (Stop category 0)

- Move 800 mm (31.5 in.) in the Y-axis direction with linear interpolation operation
- Operating speed: 1,000 mm/s
- Load mass: 1 kg (2.2 lb.)

Axis	Stopping distance [deg]	Stop time [ms]
S-axis (M1)	30.92	1,144
L-axis (M2)	–0.54	
U-axis (M3)	–0.40	
R-axis (M4)	–22.83	

Data for the stopping distance and stop time is depend on Oriental Motor’s measurement conditions.

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Published in March 2026

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