

TECHNICAL REFERENCE

αSTEP

AZ Series Motor AZME

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Introduction

■ Before use

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

■ Related operating manuals

For operating manuals, download from Oriental Motor Website Download Page or contact your nearest Oriental Motor sales office.

- **AZ Series Motor AZME TECHNICAL REFERENCE** (this document)
- **AZ Series / Motorized Actuator equipped with AZ Series OPERATING MANUAL** Function Edition

Refer to the operating manual of the driver for contents not described in these manuals.

Safety precautions

The precautions described below are intended to ensure the safe and correct use of the product, and to prevent the customer and others from exposure to the risk of injury. Use the product only after carefully reading and fully understanding these instructions.

Description of signs

	Handling the product without observing the instructions that accompany a "WARNING" symbol may result in serious injury or death.
	Handling the product without observing the instructions that accompany a "CAUTION" symbol may result in injury or property damage.
	The items under this heading contain important handling instructions that the user should observe to ensure the safe use of the product.

Thank you for purchasing an Oriental Motor product.
This Technical Reference describes product handling procedures and safety precautions.

- Please read it thoroughly to ensure safe operation.
- Always keep the manual where it is readily available.

Description of graphic symbols

	Indicates "prohibited" actions that must not be performed.
	Indicates "compulsory" actions that must be performed.

 WARNING

	Do not use the motor in explosive or corrosive environments, in the presence of flammable gases, in places subjected to splashing water, or near combustibles. Doing so may result in fire, electric shock, or injury.
	Do not transport, install, connect, or inspect the motor while the power is supplied. Doing so may result in electric shock.
	Do not forcibly bend, pull, or pinch the cable. Doing so may result in fire or electric shock.
	Do not disassemble or modify the motor. Doing so may result in injury or damage to equipment.
	Assign qualified personnel to the task of installing, wiring, operating/controlling, inspecting, and troubleshooting the motor. Failure to do so may result in fire, electric shock, injury, or damage to equipment.
	Take measures to keep the moving part in position if the product is used in vertical operations such as elevating equipment. Failure to do so may result in injury or damage to equipment.
	Do not use the brake mechanism of the electromagnetic brake motor for braking or as a safety brake. Doing so may result in injury or damage to equipment.
	When an alarm is generated in the driver (any of the driver's protective functions is triggered), take measures to hold the moving part in a specific position since the motor stops and loses its holding torque. Failure to do so may result in injury or damage to equipment.
	Install the motor inside an enclosure. Failure to do so may result in electric shock or injury.

 CAUTION

	Do not use the motor beyond its specifications. Doing so may result in electric shock, injury, or damage to equipment.
	Keep your fingers and objects out of the openings in the motor. Failure to do so may result in fire, electric shock, or injury.
	Do not touch the motor during operation or immediately after stopping. Doing so may result in a skin burn(s).
	Do not carry the motor by holding the motor output shaft or motor cable. Doing so may result in injury.
	Keep the area around the motor free of combustible materials. Failure to do so may result in fire or a skin burn(s).
	Do not leave anything around the motor that would obstruct ventilation. Doing so may result in damage to equipment.
	Do not touch the rotating part (output shaft) during operation. Doing so may result in injury.
	Do not touch the terminals while conducting the insulation resistance measurement or the dielectric strength test. Doing so may cause electric shock.

CAUTION

	Provide a cover over the rotating part (output shaft) of the motor. Failure to do so may result in injury.	
	Use a motor and a driver only in the specified combination. An incorrect combination may cause a fire.	
	Provide an emergency stop device or emergency stop circuit external to the equipment 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.	
	The motor surface temperature may exceed 70 °C (158 °F) even under normal operating conditions. If the operator is allowed to approach the motor in operation, affix a warning label shown in the figure on a conspicuous position. Failure to do so may result in a skin burn(s).	

Warning label

Precautions for use

This section covers restrictions and requirements the user should consider when using the product.

- **Be sure to use Oriental Motor cable to connect the motor and driver.**

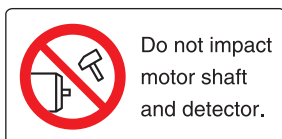
Check on the Oriental Motor Website for the model name of cables.

- **When conducting the insulation resistance measurement or the dielectric strength test, be sure to separate the connection between the motor and the driver.**

Conducting the insulation resistance measurement or dielectric strength test with the motor and driver connected may result in damage to the product.

- **Make sure not to hit or apply a strong impact on the motor output shaft or the encoder .**

Applying a strong impact on the motor output shaft or the encoder may cause encoder damage or motor malfunction. The warning label shown in the right is attached on the motor.



Warning label

- **Do not move the encoder toward a strong magnetic field.**

A magnetic sensor is built into the encoder. If the motor is installed close to equipment which generates a strong magnetic field, the encoder may break or malfunction.

Keep the magnetic flux density on the surface of the encoder so as not to exceed the values in the table.

Magnetic flux density	
When transporting and storing	When operating
5 mT	2 mT

- **Do not apply a load torque, radial load, or axial load to the output shaft on the opposite side of the motor output shaft.**

This may damage the encoder or cause encoder malfunction.

- **Do not apply a radial load and axial load in excess of the specified permissible limit.**

Continuing to operate the motor under an excessive radial load or axial load may damage the bearings (ball bearings). Be sure to operate the motor within the specified permissible limit of radial load and axial load.

- **Use the motor in conditions where the motor surface temperature does not exceed 90 °C (194 °F).**

The surface temperature on the motor case may exceed 90 °C (194 °F) depending on operating conditions such as ambient temperature, operating speed, duty cycle, and others. In order to protect the encoder, use the motor so that the surface temperature on the motor case does not exceed 90 °C (194 °F). If the encoder temperature reaches the upper limit, an alarm of Motor overheat will be generated.

- **Holding torque at standstill**

The motor holding torque is reduced by the current cutback function of the driver at motor standstill. When selecting a motor, check the holding torque at motor standstill in the specifications on the Oriental Motor Website.

- **Noise elimination measures**

For measures with regard to noise, refer to the operating manual of the driver.

- **Do not use the electromagnetic brake to reduce speed or as a safety brake.**

Do not use the electromagnetic brake as a means to decelerate and stop the motor. The brake hub of the electromagnetic brake will wear significantly and the braking force will drop. Since the power off activated type electromagnetic brake is equipped, it helps maintain the position of the load when the power is cut off, but this brake cannot securely hold the load in place. Accordingly, do not use the electromagnetic brake as a safety brake. To use the electromagnetic brake to hold the load in place, do so after the motor has stopped.

Notes when the connection cable is used

Note the following points when Oriental Motor cable is used.

- **When inserting the connector**

Hold the connector main body, and insert it in straight securely.

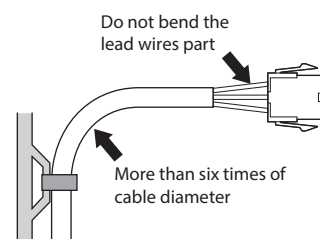
Inserting the connector in an inclined state may result in damage to terminals or a connection failure.

- **When pulling out the connector**

Pull out the connector in straight while releasing the lock part of the connector. Pulling out the connector with holding the cable may result in damage to the connector.

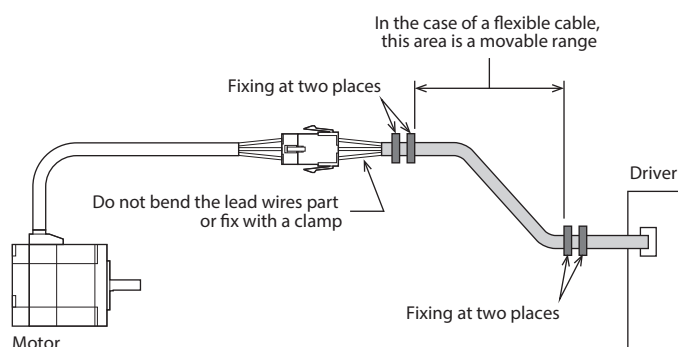
- **Bending radius of cable**

Use the cable in a state where the bending radius of the cable is more than six times of the cable diameter. Do not bend the lead wires part or fix it with a clamp. Doing so may cause damage to the connector.



- **How to fix the cable**

Fix the cable at two places near the connectors as shown in the figure, or fix it with a wide clamp in order to take measures to prevent the connectors from being stressed.



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.

- Motor 1 unit
- Instructions and Precautions for Safe Use..... 1 copy

■ How to identify the product model

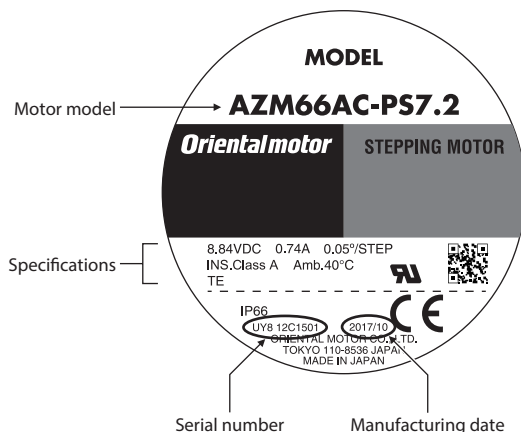
Check the model name of the motor against the number shown on the nameplate.

AZM **E** **2** **4** **B** **2** **K**
 1 2 3 4 5 6 7

1	Series name	AZM: AZ Sereis motor
2	Encoder type	E: Energy harvesting sensor
3	Motor frame size	1: 20 mm (0.79 in.) 2: 28 mm (1.10 in.)
4	Motor length	
5	Motor shaft features	B: Double shaft M: With electromagnetic brake
6	Additional function	Blank: Round shaft with shaft flat on one side 2: Through-hole shaft
7	Motor power supply input	K: DC power input type

■ Information about nameplate

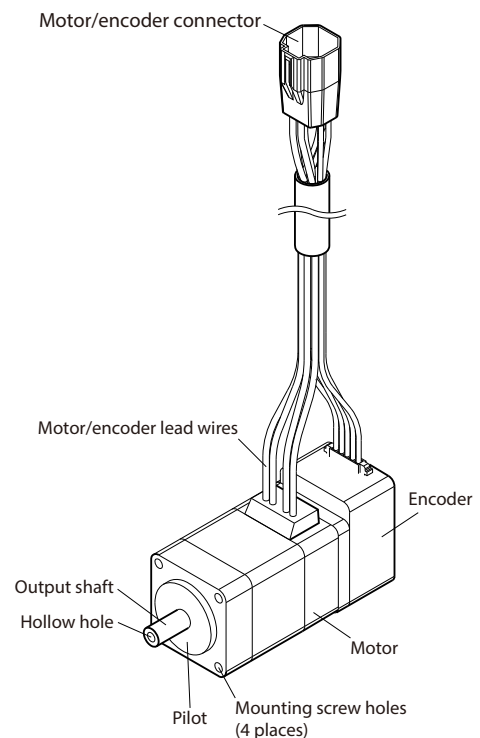
The figure shows an example.



The position describing the information may vary depending on the product.

■ Names of parts

Example: **AZME14B2K**



Installation

■ Installation location

The motor is designed and manufactured to be incorporated in 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 that is installed indoors (provide vent 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 or 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 vibrations or excessive shocks
- Area free of excessive electromagnetic noise (from welders, power machinery, etc.)
- Area free of radioactive materials, magnetic fields or vacuum
- Altitude: 1,000 m (3,300 ft.) or lower above sea level

● If a motor is installed in an environment where a magnetic field is generated

A magnetic sensor is built into the encoder. If the motor is installed close to equipment which generates a strong magnetic field, the encoder may break or malfunction.

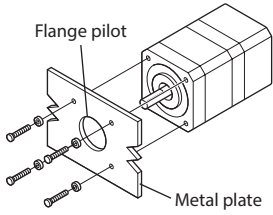
Keep the magnetic flux density on the surface of the encoder so as not to exceed 2 mT.



Do not install the motor close to equipment which generates a strong magnetic field.

■ Installation method

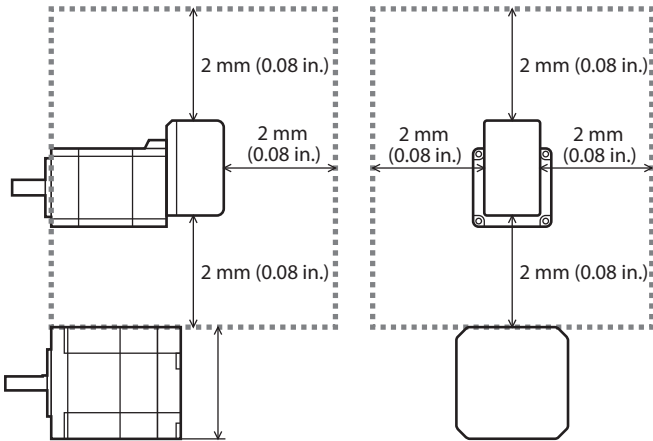
The motor can be installed in any direction. To allow for heat dissipation and prevent vibration, install the motor on a metal surface of sufficient strength.



● Installation for motors

Since the encoder for the motors are affected by a magnetic field, make sure the installation location.

When installing two or more motors side by side, provide more clearance around the encoder than 2 mm (0.08 in.).



● Nominal size, tightening torque and installation method

The values of the tightening torque are recommended. Tighten the screws to a torque appropriate for the design condition of the metal surface being installed.

Motor model	Nominal size	Tightening torque [N·m (oz·in.)]	Effective depth of screw thread [mm (in.)]
AZME14 AZME15	M2	0.25 (35)	2.5 (0.098)
AZME24 AZME26	M2.5	0.5 (71)	2.5 (0.098)

■ Installing a load

When installing a load to the motor, align the centers of the motor output shaft and load shaft. When installing a coupling or pulley on the motor output shaft, do so without damaging the output shaft and bearings (ball bearings).

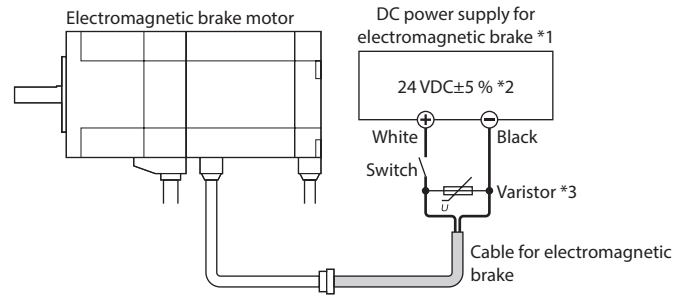
● Electromagnetic brake motor

To release the electromagnetic brake and install the load, a DC power supply is needed to power the electromagnetic brake.

Connect the DC power supply (24 VDC $\pm$ 5 %) to the motor using the "cable for electromagnetic brake."



If a cable for mini Driver is used, the electromagnetic brake cannot be released using a DC power supply. Refer to the operating manual of the mini Driver for how to release the electromagnetic brake.



*1 The power supply current capacities is 0.06A or more.

*2 If the distance between the motor and driver is extended to 20 m (65.6 ft.), use a power supply of 24 VDC $\pm$ 4 %.

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

● When a coupling or a pulley is installed

When installing a coupling or pulley on the output shaft, do not apply a strong force to the output shaft. A mechanical impact may cause damage to the encoder.

■ Permissible radial load, permissible axial load



- Failure due to fatigue may occur when the motor output shaft and the bearings (ball bearings) are subject to repeated loading by a radial or axial load that is in excess of the permissible limit.
- Do not apply a load torque, radial load, or axial load to the output shaft on the opposite side of the motor output shaft. This may damage the encoder or cause encoder malfunction.

● Permissible radial load

Motor model	Permissible radial load [N (lb.)]				
	Distance from the end of motor output shaft [mm (in.)]				
	0 (0)	5 (0.2)	10 (0.39)	15 (0.59)	20 (0.79)
AZME14 AZME15	12 (2.7)	15 (3.3)	—	—	—
AZME24 AZME26	25 (5.6)	34 (7.6)	52 (11.7)	—	—

● Permissible axial load

Motor model	Permissible axial load [N (lb.)]
AZME14 AZME15	3 (0.67)
AZME24 AZME26	5 (1.12)

Regulations and standards

■ CE Marking / UKCA Marking

● EU EMC Directive / UK EMC Regulations

The EMC test is conducted in a state where the motor is connected to the driver. The driver that is combined with the motor complies with the EMC Directive/Regulations. Refer to the operating manual of the driver for details.

● EU RoHS Directive / UK RoHS Regulations

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

Inspection and maintenance

■ Inspection

It is recommended that periodic inspections would be conducted for the items listed below after each operation of the motor. If an abnormal condition is noted, discontinue any use and contact your nearest Oriental Motor sales office.

● Inspection item

- Check if any of the screws having installed the motor is loose.
- Check if an unusual noise is generated from a bearing part (ball bearings) of the motor.
- Check if a damage or stress is applied on the cable.
- Check if any of the connection parts of the driver is loose.
- Check if the motor output shaft and the load shaft are out of alignment.

■ 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.

General specifications

Degree of protection	IP20: AZME24MK, AZME26MK IP40 (Excluding the mounting surface and connectors.): Motors other than the above types	
Operation 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
	Surrounding atmosphere	No corrosive gas, dust, water or oil
Storage environment 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
	Surrounding atmosphere	No corrosive gas, dust, water or oil
Insulation resistance	100 MΩ or more when 500 VDC megger is applied between the following places: • Case - Motor windings • Case - Electromagnetic brake windings	
Dielectric strength	Sufficient to withstand the following for 1 minute: • Case - Motor windings 0.5 kVAC 50/60 Hz • Case - Electromagnetic brake windings 0.5 kVAC 50/60 Hz	

About the operating manual of the driver

The motors described in this document can be combined with the **AZ** Series DC input type drivers. When referring to the driver operating manual, read it by changing the motor models.

	This document	The operating manual of the driver
Motor model	AZME●●	AZM●●

Note that the following items are different from **AZM14**, **AZM15**, **AZM24** and **AZM26**.

■ Specifications

Motor model	AZME14 AZME15 AZME24 AZME26	AZM14 AZM15 AZM24 AZM26 (reference)
Input power supply voltage	24 VDC±5 % * 48 VDC±5 %	24 VDC±5 % *
Multi-rotation amount of sensor	1,800 revolutions	900 revolutions

* When an electromagnetic brake motor is used, if the wiring distance between the cable type motor and the driver is extended to 20 m (65.6 ft.) using our cable, the input voltage is 24 VDC±4 %.

■ Alarm

Motor model	AZME14 AZME15 AZME24 AZME26	AZM14 AZM15 AZM24 AZM26
Generation condition of alarms (Motor overheat)	95 °C (203 °F)	85 °C (185 °F)
Causes of the motor combination error (Alarm code 45h)	-	48 VDC was applied
Sensor error at power on (Alarm code 42h)	Sub code 07h *	-

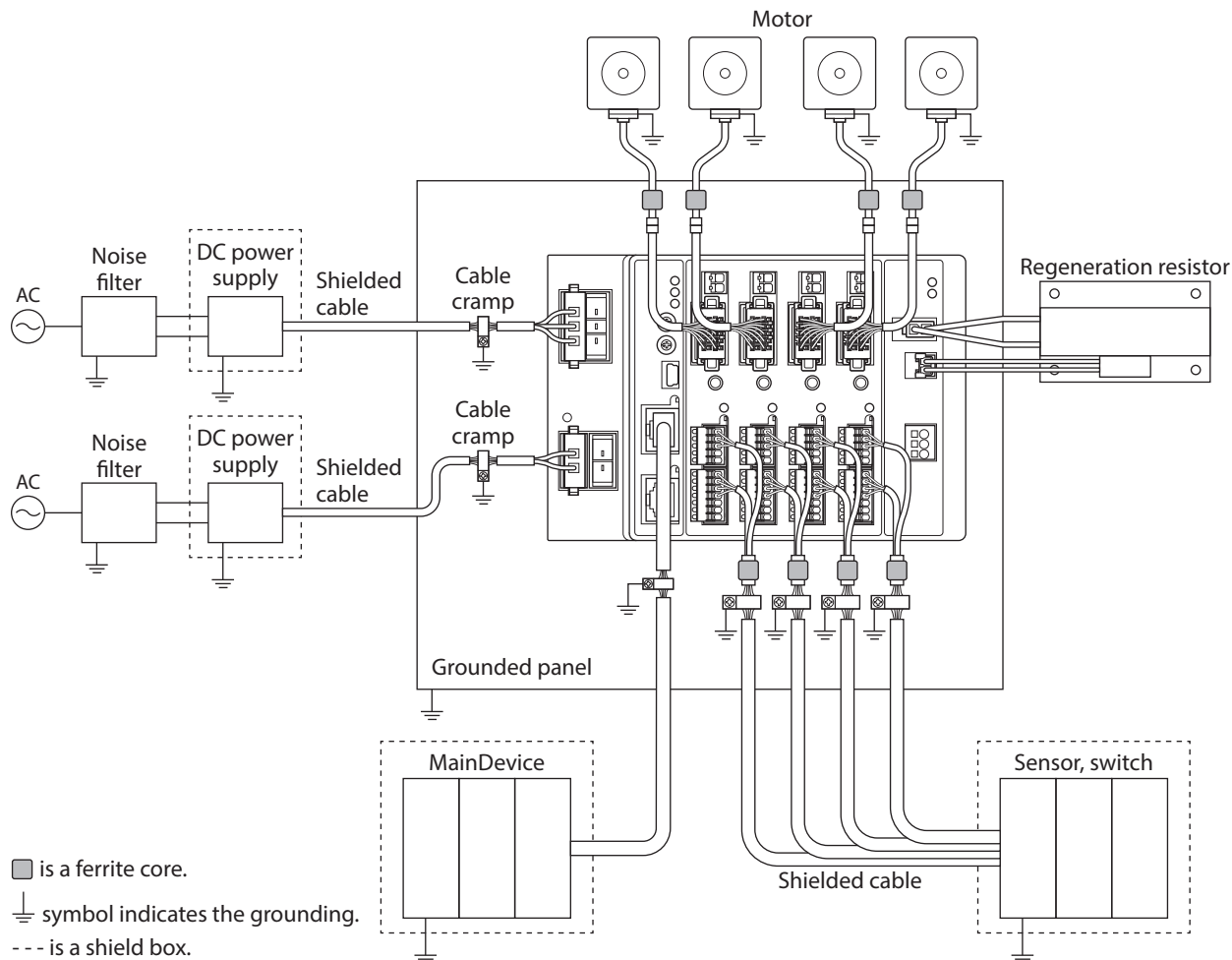
* Remedial action: The sensor is damaged. Contact your nearest Oriental Motor sales office.

■ Compliance with the EMC Directive/Regulations

For **AZM14**, **AZM15**, **AZM24** and **AZM26**, the EMC test is conducted with the motor grounded. When combined with a DC input multi-axis driver, ferrite cores are installed on the I/O signal lines.

● Example of installation and wiring

The figure shows an example when the DC power input multi-axis driver is used.



Note

- The driver uses components that are sensitive to electrostatic charge. Take measures against static electricity since static electricity may cause the driver to malfunction or suffer damage.
- When connecting the products, cover the motor cable with a shielded braided sleeving. Use the cable clamps to ground both ends of the shielded braided sleeving.

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