

OPERATING MANUAL

AC Axial Flow Fans

MRS Series MRS30

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

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

Introduction




■ Before using the product

Only qualified personnel of electrical and mechanical engineering should work with the product. Use the product correctly after thoroughly reading the section "Safety precautions." In addition, be sure to observe the contents described in warning, caution, and note in this manual.



The product described in this document has been 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 damage caused through failure to observe this warning.



Safety precautions



The precautions described below are intended to ensure the safe and correct 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.




 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.

[Description of graphic symbols]

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

 WARNING	
	<ul style="list-style-type: none">• Do not use the product 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 use the product in an environment where it is exposed to water, oil, solvents, chemicals, or other liquids, or in a space where it is volatile. The resin part (blades) is damaged, resulting in injury or damage to equipment.• Do not transport, install, connect, or inspect the product while the power is supplied. Always turn off the power before carrying out these operations. This may result in electric shock.• Do not forcibly bend, pull or pinch the lead wire. Doing so may result in fire or electric shock.• Do not touch the connection terminals of the capacitor immediately after the power is turned off (for a period of 30 seconds). The residual voltage may cause electric shock.• Do not disassemble or modify the fan. Doing so may cause electric shock, injury or damage to equipment. Refer all such internal inspections and repairs to the branch or sales office from which you purchased the product.

 WARNING	
	<ul style="list-style-type: none">• Only qualified and educated personnel should be allowed to perform installation, connection, operation and inspection/ troubleshooting of the product. Handling by unqualified and uneducated personnel may result in fire, electric shock or injury.• Turn off the power supply if the overheat protection device (thermal protector) is activated. The fan may suddenly start rotating when the overheat protection device automatically returns, causing injury or damage to equipment.• The fan is Class I equipment. When installing the fan, ground its Protective Earth Terminals. Failure to do so may result in electric shock.• Install the fan in an enclosure in order to prevent electric shock or injury.• Be sure to keep the input power voltage within the specified range. Failure to do so may result in fire or electric shock.• Perform connections securely according to the connection diagram. Failure to do so may result in fire or electric shock.• Insulate the connection terminals of the included. Failure to do so may result in electric shock.• Turn off the power in the event of a power failure. Otherwise, the fan will start unexpectedly when the power is restored. This may cause injury or damage to equipment.

 CAUTION	
	<ul style="list-style-type: none">• Do not use the fan beyond its specifications. Doing so may result in electric shock, injury, or damage to equipment.• Do not use the fan beyond the maximum static pressure. The fan will generate a large amount of heat, causing the thermal protector to activate. The fan will stop, which may result in damage to the equipment. Use the fan below the permissible current.• Do not conduct the insulation resistance measurement or dielectric strength test between the lead wires of fan windings and the lead wires of the alarm. Doing so may cause damage to the alarm circuit.• Keep your fingers and objects out of the openings in the fan. This may cause injury.• Do not touch the motor part while operating or immediately after stopping. The surface is hot and it may cause a skin burn(s).• Do not lift the product by holding the rotating part (blades) or lead wire of the fan. Doing so may cause injury.• Keep the area around the fan free of combustible materials. Failure to do so may result in fire or a skin burn(s).• Do not leave anything around the fan that would obstruct ventilation. Doing so may result in damage to equipment.• Do not touch the rotating part (blades) when the fan is in operation. Doing so may cause injury. The use of the finger guard is recommended to ensure protection.
	<ul style="list-style-type: none">• Immediately when trouble has occurred, stop operation and turn off the power supply. Failure to do so may result in fire, electric shock or injury.• The motor surface temperature of the fan may exceed 80 °C (176 °F) even under normal operating conditions. If the operator is allowed to approach the fan that is operating, attach a warning label as shown in the figure in a conspicuous position. Failure to do so may result in a skin burn(s).



Checking the product

■ Package contents

Verify that the items listed below are included.

Report any missing or damaged items to the branch or sales office from which you purchased the product.

- ☐ Fan 1 unit
 - ☐ Capacitor 1 piece*
 - ☐ Capacitor cap..... 1 piece*
 - ☐ Instructions and Precautions for Safe Use 1 copy
- * Included with single-phase fans only

■ How to identify the product model

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

Tell us the model name, product serial number, and manufacturing date shown on the nameplate when you contact us.

• Example of the product name

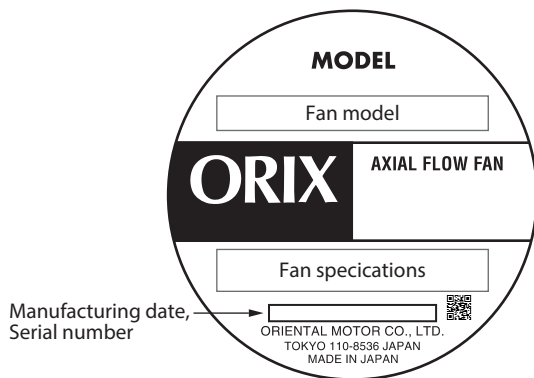
MRS 30 - JS B

1 2 3 4

1	Series name	MRS: MRS Series
2	Frame size	30: 300 mm (11.81 in.)
3	Rated voltage	EC: Single-phase 220/230 VAC JS: Three-phase 200 VAC
4	Additional function	Blank: No additional functions B: Low-speed alarm, contact alarm type

■ Information about nameplate

The figure shows an example.



Installation

■ Installation location

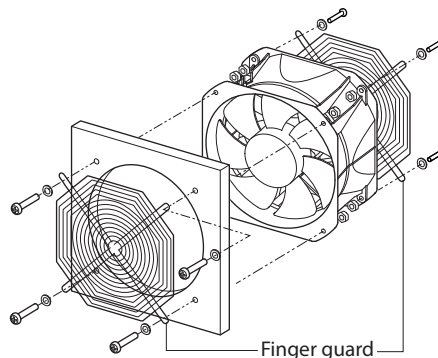
Install the product in the following location that provides easy access for inspection.

- Inside an enclosure installed indoors
- Operating ambient temperature: -30 to $+60$ °C [-22 to $+140$ °F]
(non-freezing, non-condensing)
- Operating ambient humidity: 85% or less (non-condensing)
- Area not subject to continuous vibration or excessive shocks
- Area free of radioactive materials, magnetic fields or vacuum
- Area not exposed to direct sun
- Area free of dust, iron particles, or the like
- Area free of excessive electromagnetic noise (from welders, power machinery, etc.)

When using near a switching circuit or high-frequency power supply, the induced current may flow inside the fan due to electromagnetic noise (conductive noise, radiative noise). If the induced current flows, the electric corrosion is caused in the bearings of the fan. As a result, it may generate the noise or shorten the service life of the products. Use the fan in the environment that the electromagnetic noise does not cause.

■ Installation method

- Install the fan on a flat metal plate with sufficient strength.
- Drill mounting holes in equipment, and secure the fan using screws (not supplied).
Hexagonal socket head screw
Screw size: M8, Tightening torque: 3 N·m (26 lb-in)
- For directions of the air flow and blades rotation, see the arrow indicated on the side of the fan frame.
- Finger guards that can prevent fingers and foreign particles from entering are available as peripheral equipment (sold separately). Install as shown in the figure when using.



Connection

Insulate all connections such as connecting sections between the fan lead wires and the power supply connections.

■ Connecting Protective Earth Terminal

Ground using the Protective Earth Terminal (⊕) of the fan.

Applicable crimp terminal:

Insulated round crimp terminal

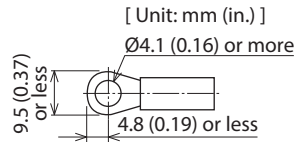
Terminal screw size: M4

Tightening torque: 1.0 to 1.3 N·m

(8.8 to 11.5 lb-in)

Applicable lead wire: AWG18 (0.75 mm²)

or thicker



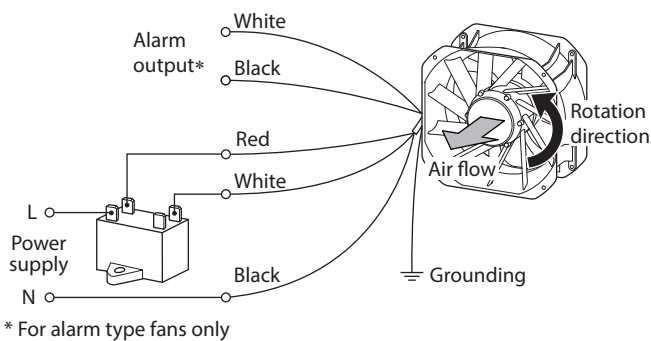
■ Connection diagram

Check the fan model name used before connecting.

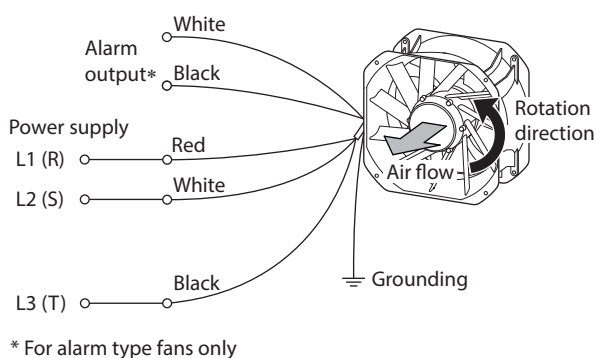
Power supply cable Lead wire size: AWG20 (0.5 mm²)

Alarm cable Lead wire size: AWG20 (0.5 mm²)

Single-phase input



Three-phase input



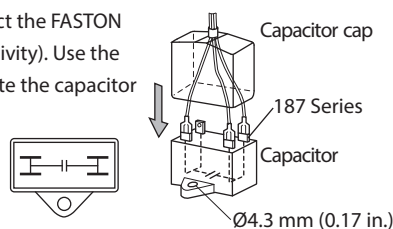
● Connecting the capacitor

If crimp terminals are used, select the FASTON Terminal 187 Series (TE Connectivity). Use the included capacitor cap to insulate the capacitor terminal connection.

The capacitor has four terminals that are internally connected as shown in the figure.

Use an M4 screw (not included) to install the capacitor securely.

Tightening torque: 1.0 N·m (8.8 lb-in)



■ Connecting the alarm output

The alarm type fans are equipped with the low-speed alarm.

If the fan speed falls to 1800±300 r/min or lower, the alarm signal is output.

● Low-speed alarm, contact alarm type (Relay output)

Output status	Normal operation: Contact ON Alarm output: Contact OFF
Connection diagram	<p>Contact capacity: Resistive load 10 VA max. (100 V max., 0.5 A max.) Minimum load: 5 V, 1 mA (Design your alarm circuit to operate at 0.5 mA or less.)</p>

Note

The alarm circuit is not equipped with a delay function. To avoid an alarm detection when the fan starts rotating or stops, a delay function is required externally. The delay time should be at least ten seconds.

Operation

The fan rotates when the power supply is turned on.

For protection against electric shock, do not turn on the power supply until the wiring is complete.

Note

Make sure that the motor case temperature does not exceed 80 °C (176 °F) when operating the fan. Operating the fan in a state where the motor case temperature exceeds 80 °C (176 °F) deteriorates the windings and ball bearings of the motor, causing the lifetime to shorten. Measure to check the motor case temperature using a thermometer, thermo tape or thermocouple.

■ When using the fan with an inverter (Three-phase input only)

- When using the fan in combination with an inverter, use it by setting the inverter frequency to 60 Hz or less.
- The inverter which input voltage exceeds 200 VAC cannot be used. The insulation of the fan motor windings may deteriorate, causing damage to the fan.
- Number of fan poles: 2 poles
- A resonance phenomenon may occur depending on the setting frequency. If the resonance phenomenon occurred, use the product with avoiding the resonance points.

Note

In the case of the alarm type fans, the low-speed alarm may operate if an inverter is used at low speeds.

Note

For lead wire connection, use one lead wire for each individual terminal.

Locked rotor burnout protection

The fan is equipped with a function of burning protection for locked-rotor state.

Thermal protection

The fan motor contains an automatic return type thermal protector in the motor windings. When the motor internal temperature exceeds the specified value, the thermal protector is activated to stop the fan. Always turn off the power before performing inspections.

Thermal protector activation range:

Power is turned off at 130 ± 5 °C (266 ± 9 °F)

Power is turned back on at 83 ± 15 °C (181 ± 27 °F)

Inspection and maintenance

■ Inspection

It is recommended that periodic inspections for the items listed below are conducted after each operation.

If an abnormal condition is noted, discontinue any use and contact your nearest Oriental Motor sales office.

● Inspection item

- Check if any of the mounting screws of the fan is loose.
- Check if the fan generates unusual noises.

■ 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.

Specifications

Check on the Oriental Motor Website for the product specifications.

General specifications

Operating environment	Ambient temperature	-30 to +60 °C [-22 to +140 °F] (non-freezing)
	Ambient humidity	85% or less (non-condensing)
	Altitude	Up to 1,000 m (3,300 ft.) above sea level
Storage environment* Shipping environment	Ambient temperature	-40 to +70 °C [-40 to +158 °F] (non-freezing)
	Ambient humidity	85% or less (non-condensing)
	Altitude	Up to 3,000 m (10,000 ft.) above sea level
Surrounding atmosphere		No corrosive gas or dust. No water or oil. Cannot be used in radioactive materials, magnetic field, vacuum or other special environments.
Degree of protection		IP00

* Storage environment

- The storage environment must be free from condensation, freezing, vibration, or external force.
- This product cannot be stored in a freezer where the temperature is controlled to -10 °C [+14 °F] or lower.
- The storage environment is a short-term value, including the time during transportation.
- This product conforms to the following environmental standards related to the storage environment.
 - ETSI EN 300 019-2-1 V2.1.2(2000-09) Class 1.3E Storage
 - ETSI EN 300 019-2-2 V2.1.2(1999-09) Class 2.3 Transportation
 - ETSI EN 300 019-2-3 V2.2.2(2003-04) Class 3.4 Stationary use

Regulations and standard

Check on the Oriental Motor Website for the regulations and standards.

■ UL Standards, CSA Standards

This product is recognized by UL under the UL and CSA Standards.

■ CE Marking / UKCA Marking

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

● EU Low Voltage Directive / UK Electrical Equipment (Safety) Regulations

Installation conditions (For EN standard)

Overvoltage category II , Pollution degree 2, Class I equipment

If the specified values of the overvoltage category III is required based on the equipment, supply the rated voltage to the fan via an isolation transformer.

● EU EMC Directive / UK EMC Regulation (Alarm type fans only)

Refer to "Conformity to EMC" on next page for details about conformity.

● EU Ecodesign Directive / UK Ecodesign Regulation

COMMISSION REGULATION(EU)

Check on the Oriental Motor Website for information about conformity such as efficiency.

● EU RoHS Directive / UK RoHS Regulation

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

Conformity to EMC

This product has been designed and manufactured to be incorporated in equipment. Effective measures must be taken against the EMI that the fan may give to adjacent controlsystem equipment, as well as the EMS of the fan itself, in order to prevent a serious functional impediment in the machinery. Oriental Motor conducts EMC testing on its motors and speed controllers in accordance with "Example of installation and wiring". The user is responsible for ensuring the machine's compliance with the EMC Directive, based on the installation and wiring explained below.

⚠ CAUTION

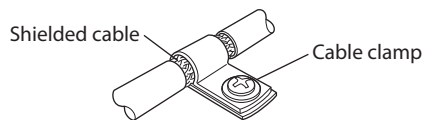
This equipment is not intended for use in residential environments nor for use on a low-voltage public network supplied in residential premises, and it may not provide adequate protection to radio reception interference in such environments.

How to ground

Cables used for grounding the fan and power supply cable (shielded cable) must be as thick and short distance as possible so that no potential difference is generated among the grounding points. Choose a large, thick and uniformly conductive surface for the grounding point.

Wiring the power supply cable

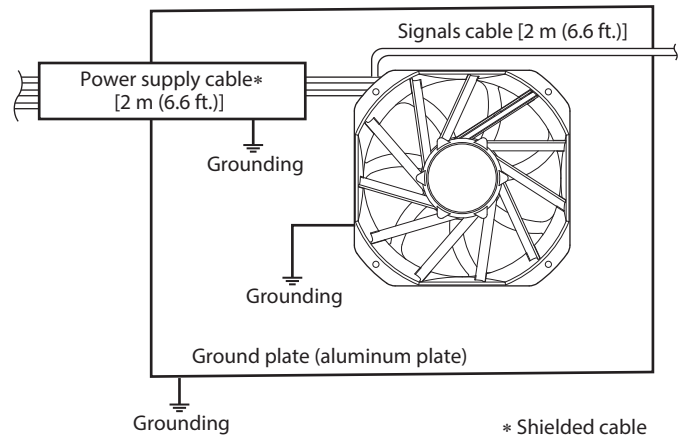
Strip a part of the shielded cable and ground the stripped part using a metal cable clamp that contacts the stripped cable around its entire circumference, or use a drain wire to make the ground connection.



Notes about installation and wiring

- Connect the fan and other peripheral control equipment directly to the grounding point so as to prevent a potential difference from developing between grounds.
- Keep cables as short as possible without coiling and bundling extra lengths.
- Wire the power lines such as the power cable away from the signal cables by providing a minimum clearance of 100 mm (3.94 in.) between them. If they must cross, do so at a right angle.

Example of installation and wiring



Precautions about static electricity

Static electricity may cause the fan to malfunction or suffer damaged. Be sure to ground the product to prevent it from being damaged by static electricity. Do not approach or touch the product while the power is on.

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- Please contact your nearest Oriental Motor office for further information.

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