

OPERATING MANUAL

DC Axial Flow Fans **MD Series**
V Type (variable flow)



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. For the power supply, use a DC power supply with reinforced insulation on its primary and secondary sides. 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, locations subjected to splashing water, or near combustibles. Doing so may cause fire or injury. Do not transport, install, connect, or inspect the product while the power is supplied. Always turn off the power before carrying out these operations. Injury may result. Do not forcibly bend, pull or pinch the lead wire. Doing so may result in fire. Do not disassemble or modify the fan. Doing so may cause injury.
	<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 or injury. Keep the input-power voltage within the specified range. Failure to do so may result in fire. For the power supply, use a DC power supply with reinforced insulation on its primary and secondary sides. Failure to do so may result in electric shock. Perform connections securely according to the connection diagram. Failure to do so may result in fire or a skin burn(s). Shut off the power to the fan in the event the rotating part (blades) is locked during operation and the burnout prevention circuit is activated. Otherwise, the fan will start unexpectedly when released from the locked condition. This may cause injury or damage to equipment. 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 injury or damage to equipment. Keep your fingers and objects out of the openings in the fan. This may cause injury. Do not lift the fan by holding the rotating part (blades) or lead wires of the fan. Doing so may cause injury. Do not remove the lead wire of the fan from the frame hook. Doing so may cause damage to the lead wire. 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) while operating. Doing so may cause injury. The use of the finger guard is recommended to ensure protection.
	<ul style="list-style-type: none"> Before installing the fan, take measures against static electricity. Failure to do so may result in damage to equipment. Immediately when trouble has occurred, stop operation and turn off the power supply. Failure to do so may result in fire or injury. Securely install the fan in an enclosure. Failure to do so may result in injury or damage to equipment.

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

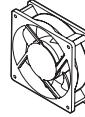
- Please read it thoroughly to ensure safe operation.
- Always keep the manual where it is readily available.

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.

<input type="checkbox"/> Fan	1 unit
<input type="checkbox"/> OPERATING MANUAL	1 copy (this document)



Fan speed controller (Sold separately)

Model: **FSC-24**

This is a speed controller for the exclusive use of the V type fans. It can easily change the duty of the Pulse-Width Modulation (PWM) signal using the setting dial.



Checking the model name

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

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

MD V 12 38 - 24 S
 ① ② ③ ④ ⑤ ⑥
 Fan size

① Series name	MD: MD Series
② Type	V: V type (variable flow)
③ Frame size	
④ Frame thickness	
⑤ Rated voltage	24: 24 VDC
⑥ Additional function	S: Pulse sensor

Installation

Installation location

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

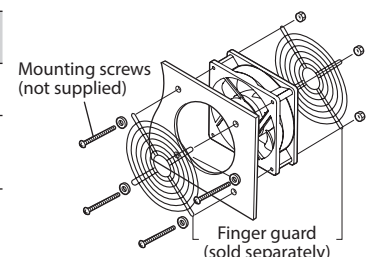
- Inside an enclosure installed indoors
 - Operating ambient temperature: -10 to +60 °C [+14 to +140 °F] * (non-freezing, non-condensing)
 Operating ambient humidity: 20 to 85% *(non-condensing)
 * The operating ambient temperature and operating ambient humidity vary depending on the product. Check on the Oriental Motor Website for the product specifications.
 - Area that is 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 not subject to continuous vibration or excessive shocks
 - Area free of radioactive materials, magnetic fields or vacuum
 - 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 onto an appropriate flat metal plate having excellent vibration resistance and heat conductivity.
- Drill mounting holes in equipment, and secure the fan using screws.
- 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.

Fan size	Screw size	Tightening torque
420	M3	0.4 N·m (3.5 lb-in)
515*, 625, 825, 925, 1225, 1238	M4	0.6 N·m (5.3 lb-in)

* When the finger guard is used, the screw size and tightening torque are M3 and 0.4 N·m (3.5 lb-in), respectively.



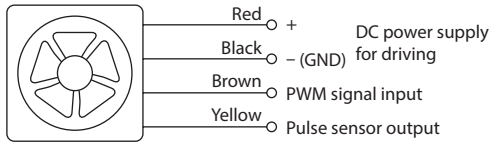
Connection

Connecting the power supply

Verify the voltage specification with the nameplate of the product, and input the suitable voltage.

Note A voltage applied to the fan may be higher than the output voltage of the DC power supply depending on the wiring distance between the fan and the DC power supply. Use the fan in a state where a voltage applied to the fan does not exceed the voltage specification.

[Connection diagram]



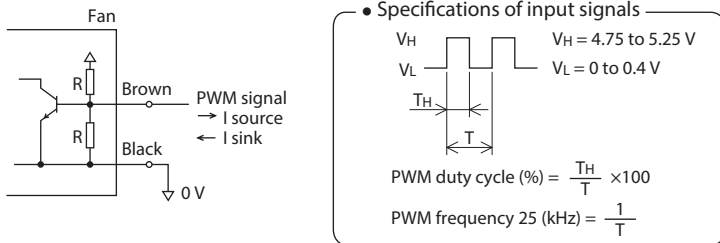
- Lead wire size: AWG26*
- * The lead wire size of **MDV1225** and **1238** are AWG24.

Connecting the I/O signals

PWM signal input for speed control

The rotation speed of the fan can be adjusted by changing the duty cycle of the PWM signal. The PWM signal can be used with equipment having a TTL output, open collector output, or open drain output.

GND of the DC power supply for driving and that of the PWM signal are common.



Current source (I source): 1 mA or less (when PWM signal 0 V is input)

Current sink (I sink): 1 mA or less* (when PWM signal 5.25 V is input)

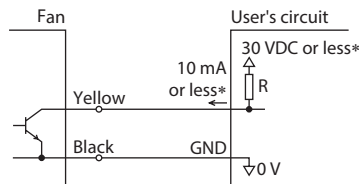
* Current sink (I sink) for **MDV1238** only: 3 mA or less

When the PWM signal input is not connected, the fan rotates at the maximum rotation speed.

Pulse sensor output

This is a sensor that outputs a square wave signal with two cycles per revolution. The rotation speed can be detected.

GND of the DC power supply for driving and that of the pulse sensor are common.



* 27.6 VDC or less and 5 mA or less for **MDV420** and **515**.

Operation

The fan starts rotating when the DC power supply is turned on.

Setting the rotation speed

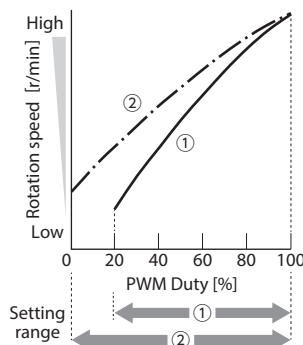
The rotation speed varies according to the duty cycle of input PWM signals. Increasing the duty cycle makes the rotation speed faster, and the airflow - static pressure increases.

Setting range

	Fan size	PWM duty
①	420, 515, 1238	20 to 100% *
②	625, 825, 925, 1225	0 to 100%

* If the PWM duty cycle falls below 20%, the fan may not rotate. Use the fan in a state of the PWM duty of 20% or more.

The PWM duty - Rotation speed characteristics vary depending on the product. For details, check on the Oriental Motor Website.



Overheat protection for locked condition

This fan is equipped with a built-in burnout prevention circuit. Since this circuit automatically controls the current flow to the windings when a locked condition is detected, it prevents the fan from burning out.

The fan resumes operation automatically as soon as it is released from the locked condition. Turn off the power at the time of inspections.

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.

Regulations and standards

UL Standards, CSA Standards, EN Standards

Applicable standards	Certification body
UL 507	UL
CSA C22.2 No.113	
EN 60950-1	TÜV

- Thermal class
UL/CSA Standards: 105(A) EN Standards: 120 (E)

Installation conditions (EN Standards)

For incorporating in equipment Overvoltage category: I
Pollution degree: 2 Protection against electric shock: Class III equipment

RoHS Directive

The products do not contain the substances exceeding the restriction values of RoHS Directive (2011/65/EU).

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Published in October 2019

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

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