

Use of Fans

1. Precautions

1.1 Precautions for Installation

- Do not use in a place where there is flammable gas and/or corrosive gas.
- DC fans are for use in the Class II (for EN60950), low voltage, limited energy circuit (for UL/CSA standard) or in the safety extra low voltage range (for EN60950).
- Fans for use only in equipment of protection Class I (AC fans only).
Lüfter zur Verwendung in Geräten der Schutzklasse I.
- Connect the ground wire to the ground terminal inside the terminal box (Terminal box type only).
Das Erdungskabel wird an dem als Erde gekennzeichneten Pol im Anschlusskasten angeklemt.
- The fan housing must be mounted with a screw and spring washer to the ground point of the equipment. (AC fans only).
Die Gehäuse der Lüfter sind mit einer Schraube und Zahnscheibe sicher mit dem geerdeten Gehäuse des Gerätes zu verbinden.
- When installing the fan into your equipment, ensure that the motor lead wires are fixed and do not move. In addition, do not apply any pressure to these lead wires.
- Installation must be performed by a qualified installer.

1.2 Precautions for Operation

- Always turn off the power to the fan before conducting checks or performing work on the fan.
- Always turn off the power to thermally protected fan before conducting checks or performing work on the fan. (Thermally Protected Fans only)
These types of fans will restart automatically when the fan temperature falls below a certain level.
- The enclosure temperature of this fan can exceed 70°C (depending on operation conditions).
In case the fan is accessible during operation, please attach the following warning label so that it is clearly visible.

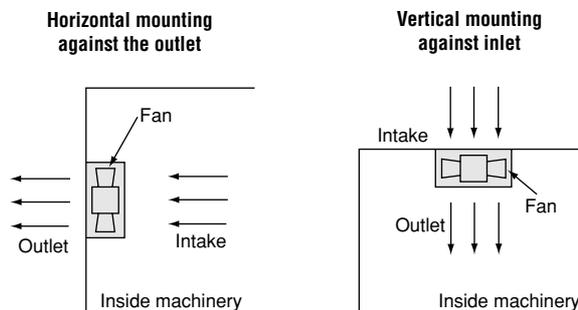


Warning label

- Do not touch the fan blades when the fan is in operation. The use of the optional finger guard is recommended to ensure protection.
Wegen der Verletzungsgefahr dürfen die Lüfterflügel bei Ventilatorbetrieb nicht berührt werden.
Der Gebrauch des als Sonderzubehör erhältlichen Fingerschutzes ist empfehlenswert, um erhöhte Sicherheit zu gewährleisten.

2. Mounting the Fan

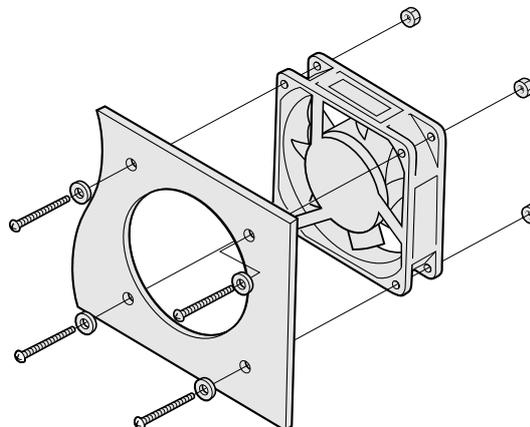
These fans can be oriented such that air is blown either horizontally or vertically. In addition, they can be mounted against either the outlet or inlet.



3. Mounting Fans in Machinery

● Axial Flow Fans

To mount the fan in machinery, drill suitable mounting holes in accordance with the mounting hole dimensional diagrams given on the same page as the product (for some fans, the shape the mounting holes is different for inlet and outlet mounting). To prevent vibration, mount the fan securely to a strong metal plate. Mounting screws are not included with the fan. Use screws of suitable size, referring to the fan's external dimensions and the mounting hole dimensional diagrams.



Recommended Tightening Torque

Model	Screw Dimensions	Tightening Torque N·m
MRS series	M5	1.2
MU series(except for MU925)	M4	0.6
MU925 type	M3	0.4
MDS•MD•MDE series (except for MD625,MDS510,MDS410)	M4	0.6
MD625,MDS510,MDS410 type	M3	0.4

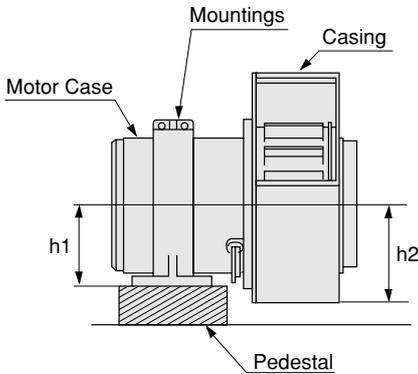
● Centrifugal Blowers

① Using special mountings

Special mountings (sold separately) matched to the diameter of the motor case can be used to mount the blower in place.

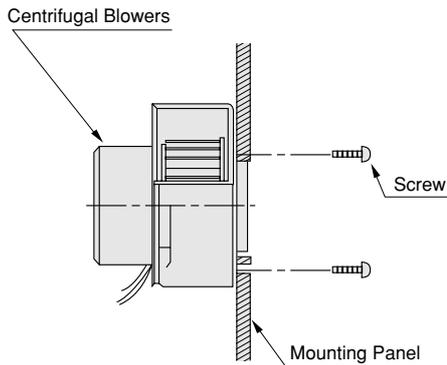


For all the blowers except **MB520** and **MB630**, h2 is longer than h1, therefore, a pedestal must be used when mounting the blower so that the casing does not touch the surface to which the fan is fixed.



② Attaching blowers directly to the machine using screws (For **MB520** and **MB630** only)

Mounting holes are provided in three spots on the **MB520** and **MB630** casings so the blowers can be fixed to the machine with no extra mounting equipment. Refer to the panel cut-out on the blower page for dimensions to drill mounting holes.



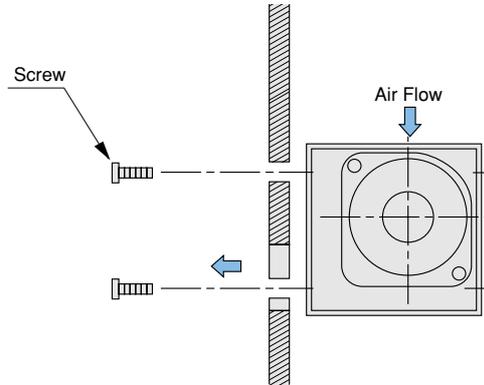
Recommended Tightening Torque

Model	Screw Dimensions	Tightening Torque N·m
MB630 type	M3 P0.5 Length=t+3.5mm	0.6
MB520 type	M3 P0.5 Length=t+2.5mm	

t:Thickness of mounting plate

● Cross Flow Fans

Cross flow fan casings have mounting holes on all sides.



Refer to the panel cut-out on the cross flow fan page for dimensions to drill the mounting holes.

Recommended Tightening Torque

Model	Screw Dimensions	Tightening Torque N·m
MF · MFD series	M4 P0.7 Length=t+5mm	1.4

t:Thickness of mounting plate

4. Mounting Locations

Install the fan and capacitor in locations that meet the following conditions.

- Indoors (the product is designed and manufactured to be mounted in a machine.)
- Ambient temperature $-10^{\circ}\text{C} \sim +60^{\circ}\text{C}$ ($-10^{\circ}\text{C} \sim +50^{\circ}\text{C}$ for **MB** series) (Nonfreezing)
- Ambient humidity $0 \sim 85\%$ (Noncondensing)
- No explosive, flammable and/or corrosive gas.
- No exposure to direct sunlight.
- No splashing water, or exposure to dust or debris.
- No oil or grease, organic solvents, acid or alkaline chemicals.
- No continuous vibration or excessive shock.
- Installation category II, Pollution degree 2, Class I equipment (EN/IEC standard)(AC fans only).
- Installation category I, Pollution degree 2, Class III equipment (EN/IEC standard)(DC axial flow fans only).

5. Installing Accessories

Dust or objects entering the machinery through the fan opening can affect the life of the machinery and cause accidents. To ensure safety and maintain performance, it is recommended that options such as finger guards, filters, screens and duct joints be installed on fans. Refer to the installation instructions given on the following pages.

- Finger Guard _____ Page C-98
- Filter _____ Page C-101
- Screen _____ Page C-103
- Duct Joint _____ Page C-104

6. Connection to Power supply

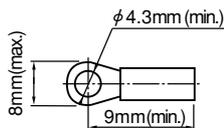
● MRS Series

MRS (excluding **MRS25**, **MRS20**) series fans use a terminal box for the power supply connection and Protective Earth (P.E.) connection, allowing the power supply cord and Protective Earth (P.E.) cord to be fastened securely. If possible, use a crimp-style terminal to connect the cord to the terminal box. Also, when connecting the power supply for fans that include alarm circuits with single-phase voltage specifications, be sure to connect the capacitor provided.

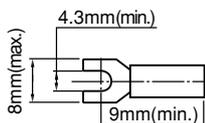


< Crimp-style Terminals that can be used >

Round terminal type with insulation

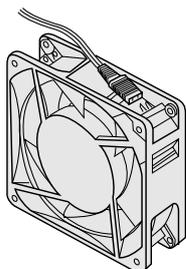


U-shaped terminal type with insulation



● MU Series

Terminals for connection to the power supply and Protective Earth (P.E.) are located in the fan frame. Using the optional power supply cord makes connections easy. Use an M4×8 mm screw and washer for the P.E. (Protective Earthing Terminal). The **MU825** type has lead wire output, so no plug cord is required.

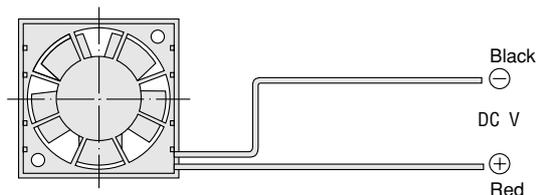


● MDS·MD, MBD, MFD, MDE Series

Use the black and red lead wires extending from the fan. Connecting the red wire to the plus (+) terminal and the black wire to the minus (-) terminal. (This applies to all DC axial-flow fans.)

Even if connections are reversed by mistake, the fan is equipped with a protection circuit to keep current from flowing in the wrong direction.

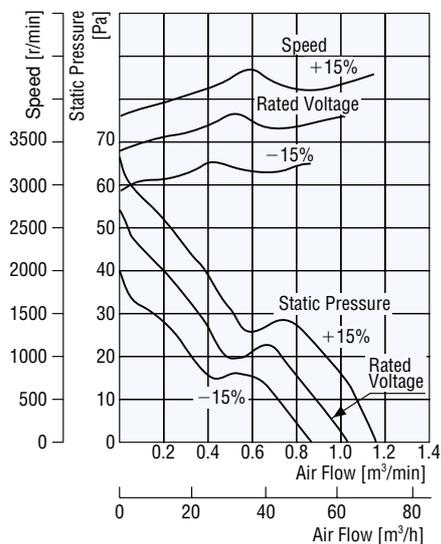
For the **MDS·MD·MDE** series, use a DC power source with reinforced insulation with the primary side.



7. Speed Adjustment

The DC fan can be operated within the usage voltage range. When the input voltage is varied within this usage voltage range, the rotation rate varies proportionally to the voltage and the fan air flow characteristic also varies.

MD825B-24



8. Alarm Circuits

The **MRS** and **MDS•MD** series include fans equipped with built-in alarm circuits that activate when the fan air flow capacity declines. The following is an explanation of these alarm detection systems.

● Electronic Output Alarm Circuits

① Models with Alarm Circuits

Alarm Functions	Series	Model
Low-speed alarm type	MRS Series	MRS25-BM, MRS25-DM, MRS20-BM, MRS20-EM, MRS18-BTM, MRS18-ETM, MRS16-BTM, MRS16-ETM,
	MDS Series	MDS1225-12M, MDS1225-24M
Stall alarm type	MDS Series	MD925A-12L, MD925A-24L
	MD Series	MD825B-12L, MD825B-24L
	MDE Series	MD625B-12L, MD625B-24L
	MDE Series	MDS510-12L, MDS510-24L MDS410-12L, MDS410-24L MDE1225-12L, MDE1225-24L

② Detection System

· Generator Voltage Detection System

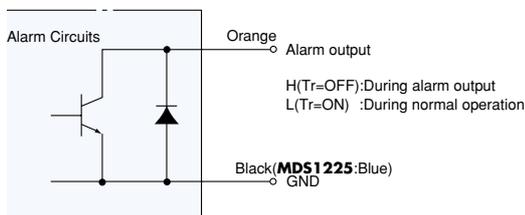
With this system, speed is detected from the voltage produced by the generator mounted on the rotation shaft. The alarm circuit is driven by this voltage and therefore requires no other power supply. However, the system requires an external start delay circuit to prevent alarms from being output during the period immediately after starting when the fan speed is below the alarm activation speed.

· Detection System in DC Brushless Fan

MDS•MD•MDE series fans use a system that detects speed by means of the stator coil's ON/OFF frequency. The alarm circuit is driven by the fan's power supply. **MDS•MD•MDE** series fan output an alarm signal when the fan starts up, (except the **MDS1225**) so they require an external start up delay circuit. When **MDS1225** fan is turned on, the alarm function begins monitoring within 10 seconds. No alarm signals are output at this time since the alarm circuit incorporates a start delay circuit

③ Electronic (open collector) Output System

With this system, alarms are output through transistor control. The system uses no mechanical contacts or moveable parts, eliminating contact noise and increasing reliability.



Maximum Output Voltage	Vout max. = 30 V
Output Leakage Current	I = 250 μ A Max.
Maximum Output current	Iout max. = 15 mA (Stall alarm type : Iout max. = 5 mA)
Output Saturation Voltage	Vout (sat) = 0.4 V Max.

④ Alarm Activation Speed

· Low-speed alarm type:

When fan speed falls below 1800 ± 300 r/min, an alarm signal (high-level) is output.

· Stall alarm type:

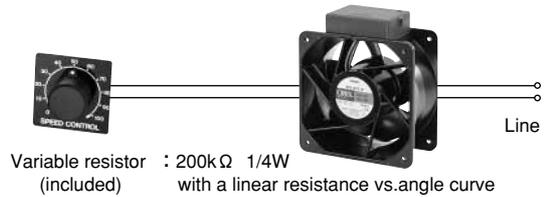
If the fan stops rotating, an alarm signal (high level) is output.

9. Use of Variable Flow Fans

● Operation of MRS18V2

① When adjusting the speed with the variable resistor

Connect the variable resistor to the lead wire coming out of the fan terminal box.

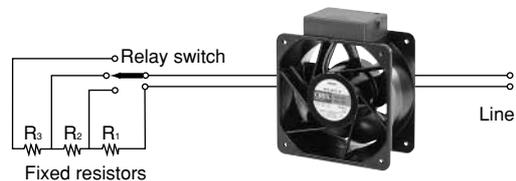


Note: Do not run a series of fans off a single Variable resistor. Circuit damage may result.

② When adjusting the speed continuously with external fixed resistors

Relay can be used to switch between fixed resistors to adjust the speed of the fan.

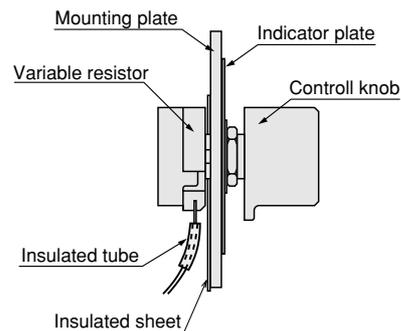
$$R1 + R2 + R3 = 200k\Omega(\text{max.}) / 1/4W(\text{min.})$$



● Speed setting variable resistor

A maximum voltage of 100V can be applied across the terminals of the variable resistor. If the variable resistor is used in an area with high electrical noise, the speed may fluctuate. Should this occur, try any of the following solutions.

- Put a noise filter on the power source line.
- Use twisted pair wire for the wiring.
- Route the wire as far as possible from lines generating noise (lines with large current flows).



Note: The indicator plate, control knob and insulated sheet are included with the variable resistor.