



Cooling Fans



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Axial Flow Fans.....F-25	AC Input MRS Series F-32	MRS
	AC Input Variable Flow MRS Series F-46	AC Input Variable Flow MRS
	AC Input MU Series F-48	MU
	DC Input MDS Series/ MD Series F-56	MDS/MD
	DC Input Long-Life MDE Series F-74	DC Input Long-Life MDE
Centrifugal BlowersF-79	AC Input MB Series F-82	MB
	DC Input MBD Series F-94	DC Input MBD
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Cooling Module.....F-105	FM Series IP55/IP43 F-105	FM
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Overview of Cooling Fans

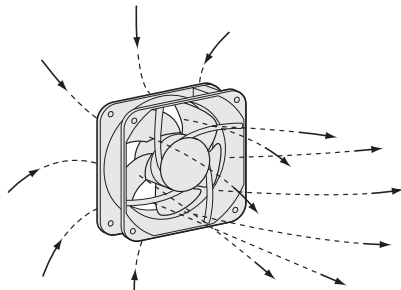
Today's comfortable life and society is supported by advanced control systems, which may present many heat sources. To operate these devices 24 hours a day, 365 days a year, the devices require appropriate heat designs and heat measures. Oriental Motor offers a wide range of heat measure products centered on cooling fans to meet these requirements.

About a Cooling Fan

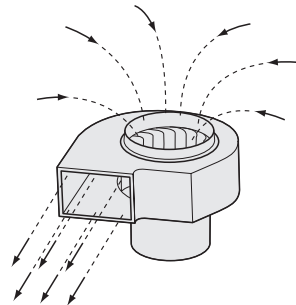
One method of cooling heat sources and enclosures is air cooling, which utilizes the air around us.

One device that can use this air is a cooling fan, which uses the power of a motor to spin a propeller or impeller to blow air.

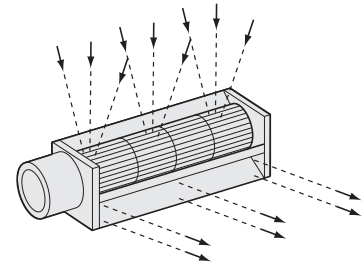
Oriental Motor provides three types of fans: axial flow fans, centrifugal blowers and cross flow fans, using different air-blowing systems.



Axial Flow Fans



Centrifugal Blowers

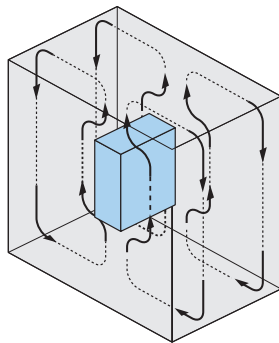


Cross Flow Fans

Highly Reliable Equipment Design Using Cooling Fans

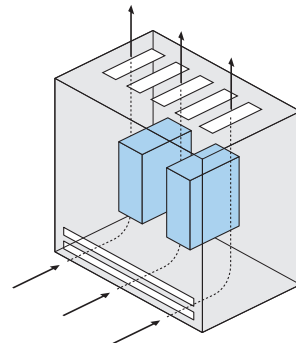
Even if the temperature of a heat source rises, cooling is not required if the temperature will not affect the heat source itself or peripheral equipment. However, if there is a danger that the heat will cause damage, some kind of cooling is required. There are two methods of cooling heat sources; natural air cooling and forced cooling. When forced cooling is required, cooling fans perform the appropriate ventilation and air-blowing. By using a cooling fan, the temperature of a heat source and its surroundings can be decreased, which enables extended equipment life, and more reliable equipment design.

Natural Air Cooling of Closed Enclosure



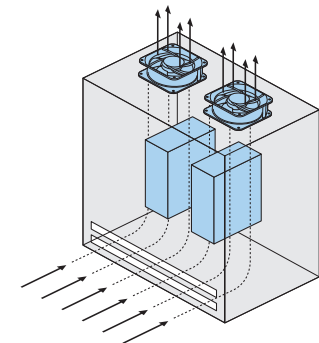
When there is no heat source, or the temperature of the heat source is low and does not affect peripheral equipment

Natural Air Cooling of Open Enclosure



When keeping enclosure temperature constant using natural air cooling, by opening air holes such as vents in the enclosure to create air flow

Forced Cooling of Open Enclosure



When the temperature of the heat source is high, or when the heat density in the enclosure is high and the temperature of the enclosure becomes extremely high

Thermal Management System

We can enjoy a comfortable life at home and work today thanks to advanced control systems. However, the devices that function as the core of such systems present many heat sources.

To operate these devices 24 hours a day, 365 days a year, the devices require appropriate heat designs and heat measures.

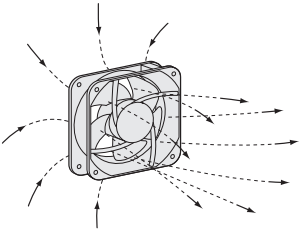
Oriental Motor can recommend the ideal products for you by examining your specific needs from the viewpoint of the Thermal Management System.

Product Line

Cooling Fans

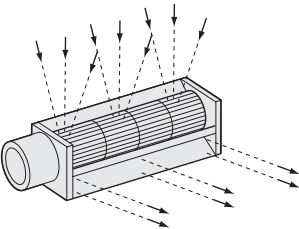
Axial Flow Fans

A large air flow is feature of axial flow fans.
Various types are available, including large size and small size.



Cross Flow Fans

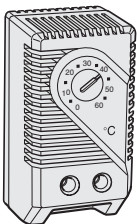
A wide, uniform air flow is a feature of cross flow fans.



Equipment that is used in combination with a cooling fan, etc.

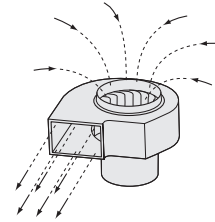
Thermostats

Thermostat automatically performs ON/OFF fan control in accordance with temperature fluctuation inside equipment.



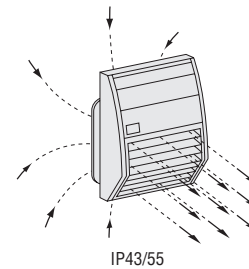
Centrifugal Blowers

A large static pressure and concentrated air flow are features of centrifugal blowers.



Cooling Module

Both IP55 and IP43 models are available.
Various types are available, including a suction type and exhaust type.



Introduction

MRS

AC Input
Variable Flow
MRS

Axial Flow Fans

MU

MDS/MD

DC Input
Long-Life
MDE

MB

Centrifugal Blowers

MBD

MF

Cross Flow Fans

MFD

Cooling
Module

FM

Thermostats

Accessories

Installation

Applications and Classifications

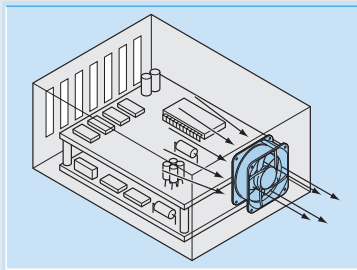
The features of cooling fans differ according to their air-blowing system. In this selection guide, we explain each selection according to the type of air-blowing system and demonstrate with example applications.

Refer to “Cooling Fans Selection Guide (Selection Based on Characteristics)” for selection according to maximum air flow and maximum static pressure, and “Cooling Fans Selection Guide (Selection Based on Purpose and Functions)” for selection according to additional functions.

Ventilation, Cooling, Drying, and Suction

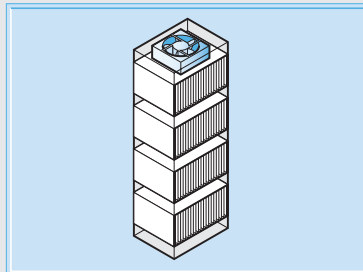
● Device Ventilation and Cooling

The large air flow of axial flow fans is suitable for ventilation and cooling inside electronic device.



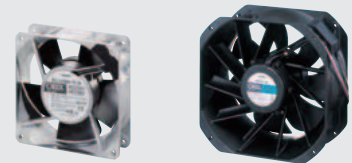
● Cooling Densely Mounted Devices

Enables energy-saving and less wiring compared to using multiple small fans.



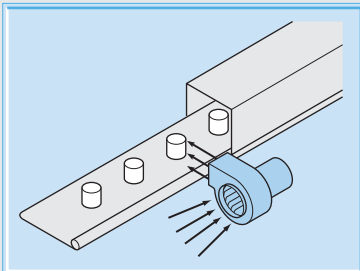
Axial Flow Fans

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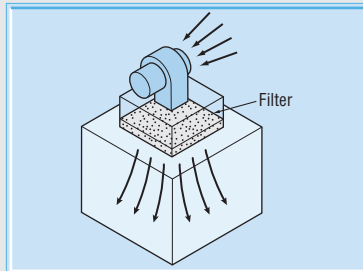
● Air-Blow Cooling or Drying

Centrifugal blowers offering high static pressures are suitable for the air-blow cooling of work pieces following heat treatment.



● Cooling with High Static Pressure

The high static pressure of centrifugal blowers makes them suitable for cooling used together with thick filters that are subject to significant pressure losses.



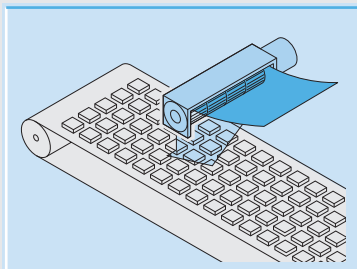
Centrifugal Blowers

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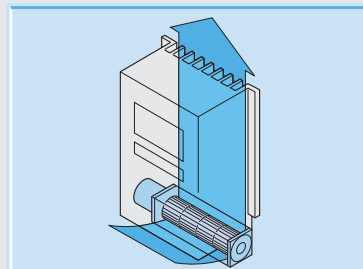
● Uniform Cooling or Drying

Cross flow fans are suitable for the air-blow cooling of wide areas.



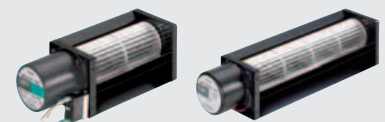
● Cooling of Long and Thin Space

Suitable for air-blow cooling of long and thin spaces, such as where electronic devices are installed.



Cross Flow Fans

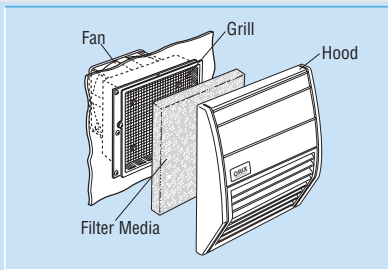
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Easy Installation and Measures for Preventing Water Droplets and Dust from Entering

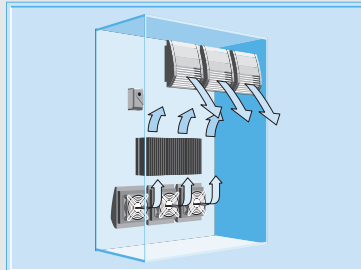
● Easy Installation and Easy Maintenance

The module can be easily installed from the outside. The filter can be replaced from outside the equipment, and maintenance is also easy.



● Ventilation and Cooling Inside Control Box

Suitable for ventilation and cooling inside a control box installed in an environment where powdery dust is mixed in with the air. Improves the reliability of the entire control box.



Cooling Module

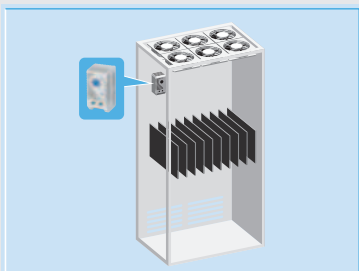
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Automatically Turning the Cooling Fan ON/OFF

● Automatically Turning it ON/OFF with a Set Temperature

The cooling fan is automatically turned ON or OFF when the temperature inside the equipment reaches the temperature switch setting.



● Example of combination with cooling fan

Thermostats

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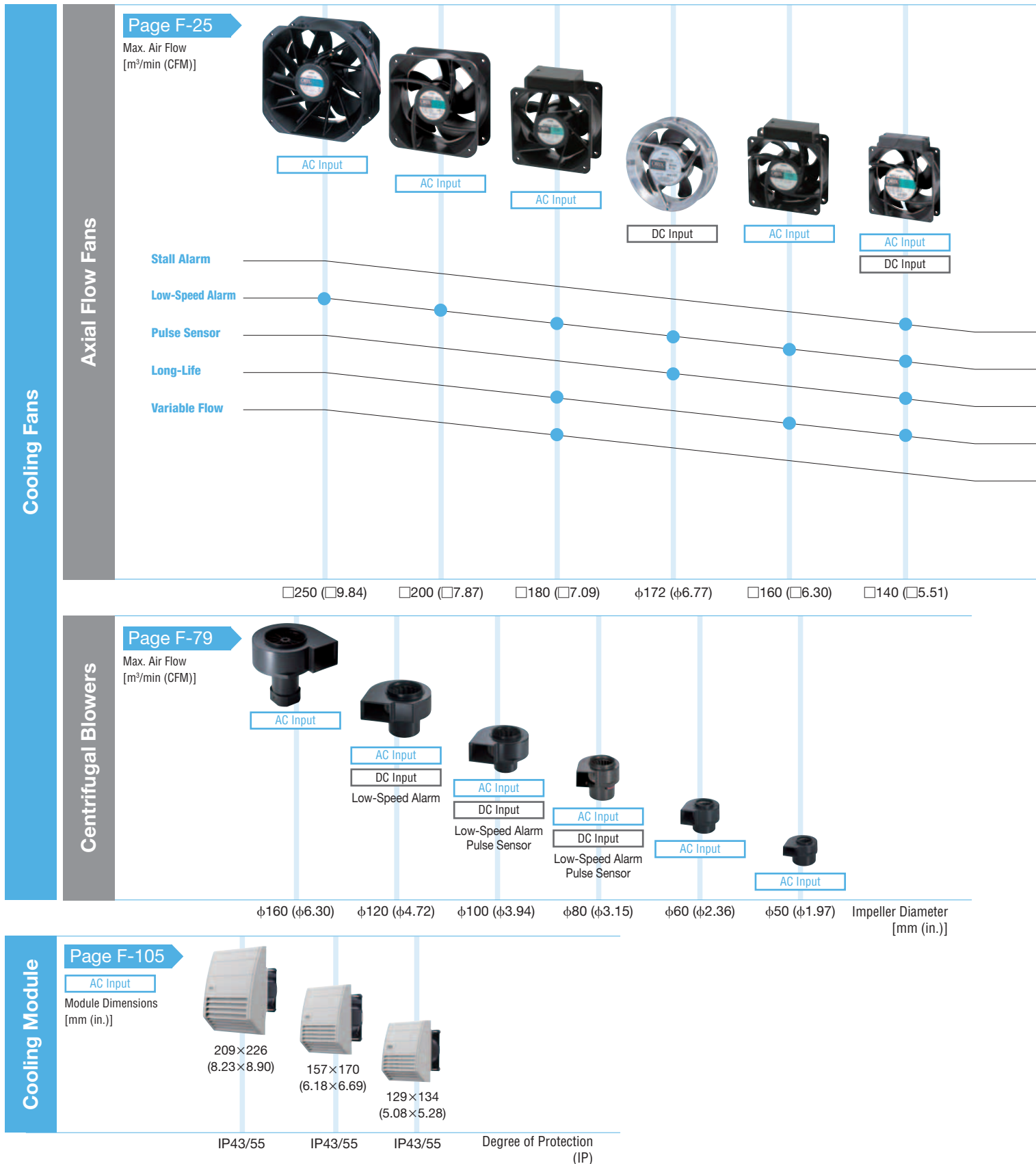


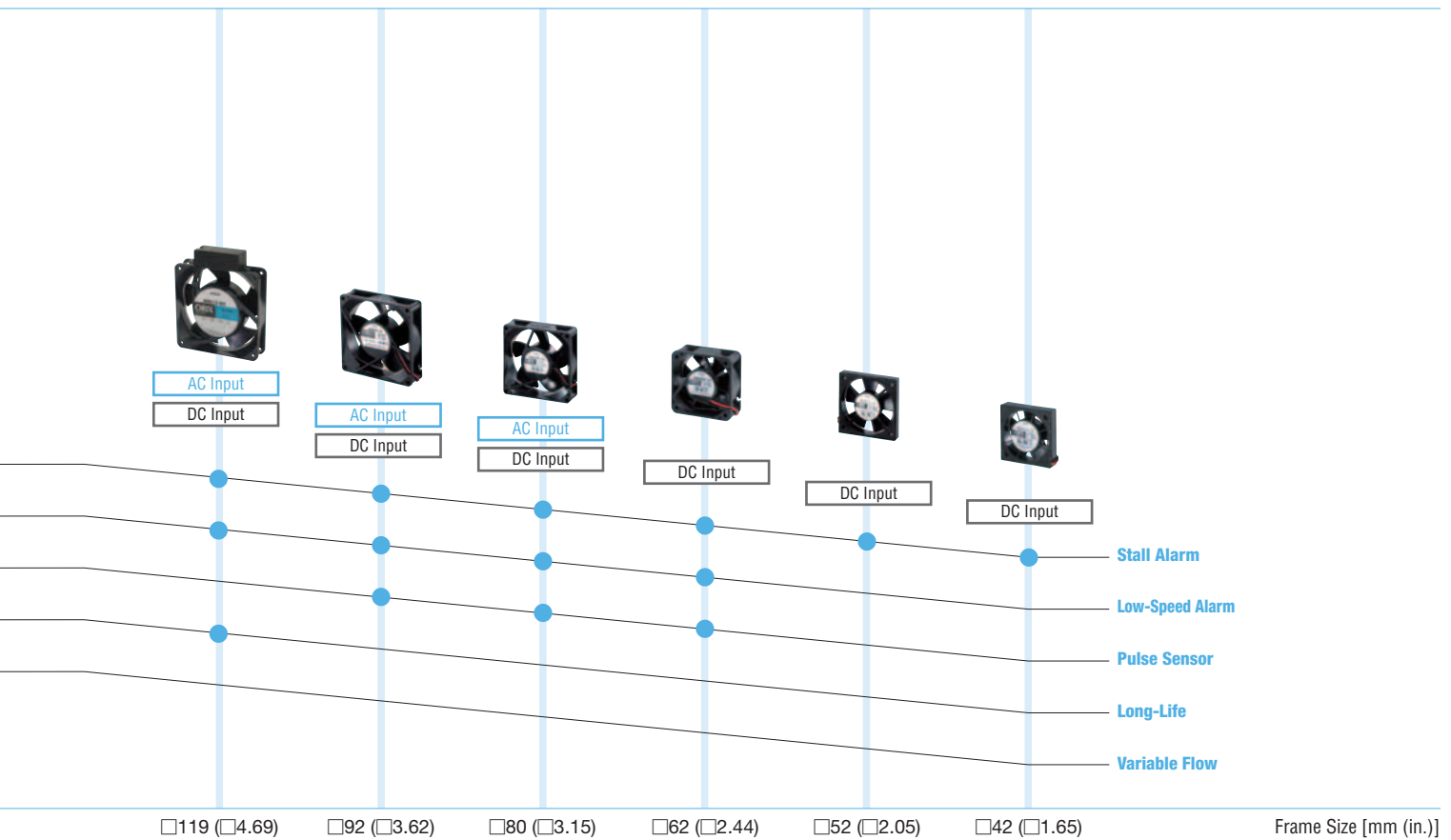
- Introduction
- MRS
- AC Input Variable Flow MRS
- MU
- MDS/MD
- DC Input Long-Life MDE
- Centrifugal Blowers
- AC Input MB
- DC Input MBD
- Cross Flow Fans
- AC Input MF
- DC Input MFD
- Cooling Module FM
- Thermostats
- Accessories
- Installation

Product Line-up of Cooling Fans

Product Line-up

We offer a wide range of fans in varying frame sizes and voltage specifications. Products with additional functions, such as alarm types and speed control types, are available.





Cross Flow Fans

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Max. Air Flow [m³/min (CFM)]

Impeller Length [mm (in.)]	Input Options	Low-Speed Alarm	Pulse Sensor
300 (11.81)	AC Input, DC Input	Yes	Yes
150 (5.91)	AC Input, DC Input	Yes	Yes

Thermostats

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Accessories

Page F-117

- Finger Guards
- Filters
- Screens
- Plug Cords
- Mounting Brackets
- Duct Joints

- Introduction
- MRS
- Variable Flow
- AC Input
- DC Input
- Long-Life
- MU
- MDS/MD
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- AC Input
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- Installation

Product Line

Cooling Fans

Axial Flow Fans (AC Input)

MRS Series

Variable Flow Low-Speed Alarm

Frame Size [mm (in.)] □250 (□9.84) □200 (□7.87) □180 (□7.09)
□160 (□6.30) □140 (□5.51)

Large AC axial flow fans.
Large air flow and high static
pressure. Full lineup.

→ Page F-32



MU Series

Frame Size [mm (in.)] □119 (□4.69) □92 (□3.62) □80 (□3.15)

Small AC axial flow fans.
Full lineup.

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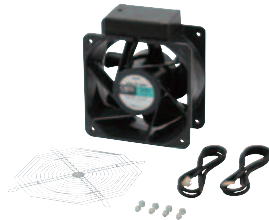
MRE Series

Long-Life Low-Speed Alarm

Frame Size [mm (in.)] □180 (□7.09) □160 (□6.30)

Long-Life fans have an expected
life of 100000 hours.

→ See website



Axial Flow Fans (DC Input)

MDS Series/MD Series

Stall Alarm Pulse Sensor

Frame Size [mm (in.)] φ172 (φ6.77) □140 (□5.51) □119 (□4.69)
□92 (□3.62) □80 (□3.15) □62 (□2.44)
□52 (□2.05) □42 (□1.65)

These are axial flow fans that employ
a brushless DC motor.

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MDA Series

Low-Speed Alarm

Frame Size [mm (in.)] □140 (□5.51) □119 (□4.69) □92 (□3.62)
□80 (□3.15) □62 (□2.44)

These are axial flow fans that employ
a brushless DC motor.

These fans are equipped with a
circuit that outputs an alarm when
the fan speed drops due to the life of
the fan, an external factor, etc.

→ See website



MDE Series

Long-Life Stall Alarm

Frame Size [mm (in.)] □140 (□5.51) □119 (□4.69)

Long-life DC axial flow fans adopting
brushless DC motors, with an
expected life of 100000 hours. Stall
alarm comes standard.

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Long-Life: Long Life Type **Variable Flow**: Variable Flow Type
Low-Speed Alarm: Alarm Type **Stall Alarm**: Stall Alarm Type **Pulse Sensor**: Pulse Sensor Type

Centrifugal Blowers (AC Input)

MB Series

Impeller Diameter [mm (in.)] $\phi 160$ ($\phi 6.30$) $\phi 120$ ($\phi 4.72$) $\phi 100$ ($\phi 3.94$)
 $\phi 80$ ($\phi 3.15$) $\phi 60$ ($\phi 2.36$) $\phi 50$ ($\phi 1.97$)

AC centrifugal blowers that have a large static pressure and can produce directional air flow.

Full lineup.

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Centrifugal Blowers (DC Input)

MBD Series

Low-Speed Alarm **Pulse Sensor**

Impeller Diameter [mm (in.)] $\phi 120$ ($\phi 4.72$) $\phi 100$ ($\phi 3.94$) $\phi 80$ ($\phi 3.15$)

DC centrifugal blowers.

Low-speed alarm type and pulse sensor type.

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Cross Flow Fans (AC Input)

MF Series

Impeller Length [mm (in.)] 300 (11.81) 150 (5.91)

AC cross flow fans with wide, uniform air flow.

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Cross Flow Fans (DC Input)

MFD Series

Low-Speed Alarm **Pulse Sensor**

Impeller Length [mm (in.)] 300 (11.81) 150 (5.91)

DC cross flow fans with wide, uniform air flow.

→ Page F-104



Cooling Module

FM Series

Degree of Protection IP43 IP55

Modular products that include guards and filters to prevent foreign objects, dust, and water droplets from reaching the cooling fan.

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Thermostats

AM1-WA1/AM1-XA1

Switches that detect the ambient temperature and automatically turn the AC cooling fan ON/OFF.

The fans can be operated only when necessary for energy-saving control.

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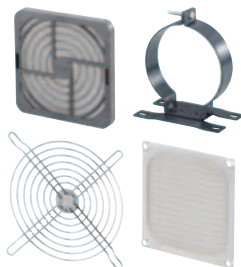


Accessories

The following accessories that can be used with each cooling fan are available.

- Finger Guards
- Filters
- Screens
- Plug Cords
- Mounting Brackets
- Duct Joints

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Cooling Fans Selection Guide (Selection Based on Characteristics)

To achieve objective work, the cooling fan needs to be selected in consideration of required performance as well as features of air flow.

The maximum air flow and maximum static pressure vary depending on the series and size of cooling fans. Select the cooling fan offering the characteristics that best suit the specifications of your equipment.

Maximum Air Flow

The following tables indicate the maximum air flow for each type and series.

AC Axial Flow Fans

Max. Air Flow [m ³ /min (CFM)] For 50/60 Hz	Frame Size [mm (in.)]	Thickness [mm (in.)]	Type	Page
21/24 (742/848)	□250 (□9.84)	120 (4.72)	MRS25	F-32
13.2/15.5 (466/547)	□200 (□7.87)	90 (3.54)	MRS20	F-34
11.0/12.8 (388/452)	□180 (□7.09)	90 (3.54)	MRS18, MRE18	F-36
6.2/7.3 (219/258)	□160 (□6.30)	62 (2.44)	MRS16, MRE16	F-40
4.5/4.6 (159/162)	□140 (□5.51)	47 (1.85)	MRS14	F-44
2.7/3.0 (95.3/106)	□119 (□4.69)	38 (1.50)	MU1238	F-48
1.6/1.9 (56.5/67.1)	□119 (□4.69)	25 (0.98)	MU1225	F-50
0.95/1.10 (33.5/38.8)	□92 (□3.62)	25 (0.98)	MU925	F-52
0.45/0.55 (15.9/19.4)	□80 (□3.15)	25 (0.98)	MU825	F-54

DC Axial Flow Fans

Max. Air Flow [m ³ /min (CFM)]	Frame Size [mm (in.)]	Thickness [mm (in.)]	Type	Page
6 (212)	φ172 (φ6.77)	51 (2.01)	MDS1751	F-56
5.8 (205)	□140 (□5.51)	51 (2.01)	MDS1451	F-58
			MDA1451	F-74
2.7 (95.3)	□119 (□4.69)	25.4 (1.00)	MDS1225	F-60
			MDA1225	F-76
2.5 (88.3)		25.4 (1.00)	MD1225	F-62
1.3 (45.9)	□92 (□3.62)	25.4 (1.00)	MD925, MDA925	F-64
1 (35.3)	□80 (□3.15)	25.4 (1.00)	MD825, MDA825	F-66
0.5 (17.7)	□62 (□2.44)	25.4 (1.00)	MD625, MDA625	F-68
0.27 (9.53)	□52 (□2.05)	10 (0.39)	MDS510	F-70
0.18 (6.35)	□42 (□1.65)	10 (0.39)	MDS410	F-72

Centrifugal Blowers

Max. Air Flow [m ³ /min (CFM)] For 50/60 Hz	Impeller Diameter [mm (in.)]	Power Supply	Type	Page
8.0/9.0 (282/318)	φ160 (φ6.30)	AC Input	MB1665	F-82
4.4/5.1 (155/180)	φ120 (φ4.72)		MB1255	F-84
2.3/2.6 (81.2/91.8)	φ100 (φ3.94)		MB1040	F-86
1.6/1.8 (56.5/63.5)	φ80 (φ3.15)		MB840	F-88
0.44/0.36 (15.5/12.7)	φ60 (φ2.36)		MB630	F-90
0.21/0.24 (7.41/8.47)	φ50 (φ1.97)		MB520	F-92
3 (106)	φ120 (φ4.72)	DC Input	MBD12	F-94
1.95 (68.8)	φ100 (φ3.94)		MBD10	F-96
1.45 (51.2)	φ80 (φ3.15)		MBD8	F-98

Cross Flow Fans

Max. Air Flow [m ³ /min (CFM)] For 50/60 Hz	Impeller Length [mm (in.)]	Power Supply	Type	Page
6.0/6.2 (212/219)	300 (11.81)	AC Input	MF930	F-104
3.4/3.7 (120/131)	150 (5.91)		MF915	
5.2 (184)	300 (11.81)	DC Input	MFD930	
3 (106)	150 (5.91)		MFD915	

Maximum Static Pressure

The following tables indicate the maximum static pressure for each series.

AC Axial Flow Fans

Max. Static Pressure [Pa (inH ₂ O)] For 50/60 Hz	Frame Size [mm (in.)]	Thickness [mm (in.)]	Type	Page
290/320 (1.16/1.28)	□250 (□9.84)	120 (4.72)	MRS25	F-32
221/186 (0.886/0.746)	□200 (□7.87)	90 (3.54)	MRS20	F-34
196/245 (0.786/0.982)	□180 (□7.09)	90 (3.54)	MRS18, MRE18	F-36
127/157 (0.509/0.63)	□160 (□6.30)	62 (2.44)	MRS16, MRE16	F-40
92/81 (0.369/0.325)	□140 (□5.51)	47 (1.85)	MRS14	F-44
81/81 (0.325/0.325)	□119 (□4.69)	38 (1.50)	MU1238	F-48
49/44 (0.196/0.176)	□119 (□4.69)	25 (0.98)	MU1225	F-50
44/59 (0.176/0.237)	□92 (□3.62)	25 (0.98)	MU925	F-52
34/49 (0.137/0.196)	□80 (□3.15)	25 (0.98)	MU825	F-54

DC Axial Flow Fans

Max. Static Pressure [Pa (inH ₂ O)]	Frame Size [mm (in.)]	Thickness [mm (in.)]	Type	Page
137 (0.549)	φ172 (φ6.77)	51 (2.01)	MDS1751	F-56
130 (0.521)	□140 (□5.51)	51 (2.01)	MDS1451	F-58
			MDA1451	F-74
86 (0.345)	□42 (□1.65)	10 (0.39)	MDS410	F-72
			MDA410	F-72
70 (0.281)	□119 (□4.69)	25.4 (1.00)	MDS1225	F-60
			MDA1225	F-60
			MDE1225	F-76
54 (0.217)	□52 (□2.05)	10 (0.39)	MDS510	F-70
			MD925, MDA925	F-64
49 (0.196)	□80 (□3.15)	25.4 (1.00)	MD825, MDA825	F-66
			MD625, MDA625	F-68
43 (0.172)	□119 (□4.69)	25.4 (1.00)	MD1225	F-62

Centrifugal Blowers

Max. Static Pressure [Pa (inH ₂ O)] For 50/60 Hz	Impeller Diameter [mm (in.)]	Power Supply	Type	Page
490/686 (1.96/2.75)	φ160 (φ6.30)	AC Input	MB1665	F-82
309/441 (1.24/1.77)	φ120 (φ4.72)		MB1255	F-84
206/284 (0.826/1.14)	φ100 (φ3.94)		MB1040	F-86
152/221 (0.610/0.886)	φ80 (φ3.15)		MB840	F-88
53/76 (0.213/0.305)	φ60 (φ2.36)		MB630	F-90
37/53 (0.149/0.213)	φ50 (φ1.97)		MB520	F-92
372 (1.49)	φ120 (φ4.72)		DC Input	MBD12
294 (1.18)	φ100 (φ3.94)	MBD10		F-96
196 (0.786)	φ80 (φ3.15)	MBD8		F-98

Cross Flow Fans

Max. Static Pressure [Pa (inH ₂ O)] For 50/60 Hz	Impeller Length [mm (in.)]	Power Supply	Type	Page
74/103 (0.297/0.414)	300 (11.81)	AC Input	MF930	F-104
88/127 (0.353/0.509)	150 (5.91)		MF915	
83 (0.333)	300 (11.81)	DC Input	MFD930	
98 (0.393)	150 (5.91)		MFD915	

Cooling Fans Selection Guide (Selection Based on Purpose and Functions)

You can improve the reliability of your equipment and reduce its overall cost by combining fans and peripheral products. Oriental Motor recommends optimal product combinations and their effective use in order to meet specific requests. We would be happy to assist you in the design of your equipment.

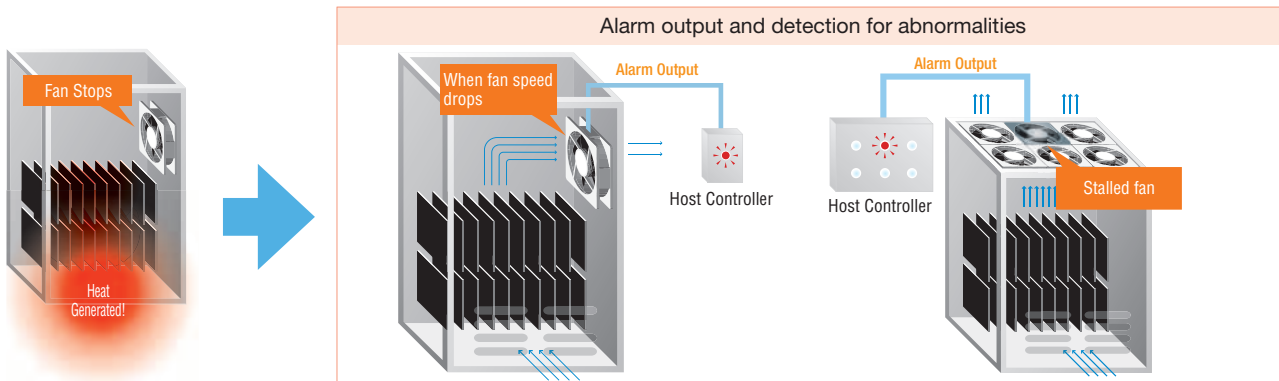
Customer Needs/Task	Page
<ul style="list-style-type: none"> ● Detect service life or trouble-related abnormality 	Low-speed Alarm Type Cooling Fans, Stall Alarm Type Cooling Fans, and Pulse Sensor Type Cooling Fans Page F-13
<ul style="list-style-type: none"> ● Reduce time and costs with replacement ● Install in hard-to-service location 	Long Life Axial Flow Fans Page F-14
<ul style="list-style-type: none"> ● Improve cooling efficiency ● High installation density inside the equipment, air cannot flow easily 	Selecting for Efficient Cooling Page F-15
<ul style="list-style-type: none"> ● Protect against foreign objects, dust, and water droplets ● Easy installation and maintenance 	Cooling Module Page F-16
<ul style="list-style-type: none"> ● Regulate air flow and static pressure 	Variable Flow Type ● AC Axial Flow Fans Page F-46
<ul style="list-style-type: none"> ● Keep temperature in equipment constant ● Eliminate unnecessary operation to reduce power consumption and noise 	Thermostats Page F-17
<ul style="list-style-type: none"> ● Simplify the ordering process ● Use the fan right away 	Fan Kit Page F-18

Low-speed Alarm Type Cooling Fans, Stall Alarm Type Cooling Fans, and Pulse Sensor Type Cooling Fans

Fans with a low-speed alarm or, stall alarms or pulse sensors enable detection of cooling problems in devices on which fans are installed. This alerts for prompt maintenance and keeps the equipment in a highly reliable condition.

The Advantages of Using Alarm Type and Sensor Type Products

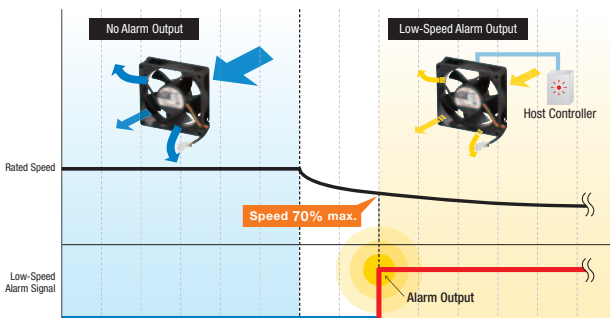
If a cooling fan is left stopped or at low speed, the internal temperature increases which has an effect on the equipment. By using a low-speed alarm type cooling fan or stall alarm type cooling fan, cooling problems are detected early to allow for maintenance.



Lineup

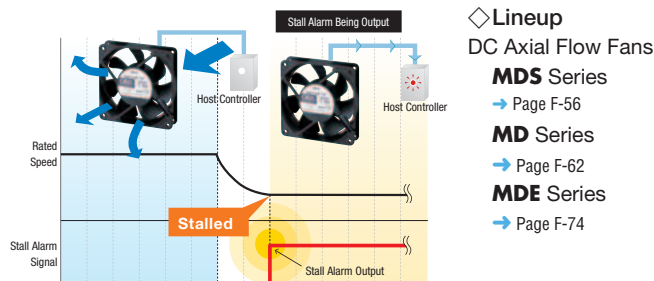
Fans with Low-Speed Alarms

An alarm is output when the fan speed drops due to the service life of the fan or the ingress of foreign objects. This makes it possible to order and replace the fan with a new one before it stops. If multiple cooling fans are being used, it is possible to only replace the cooling fan with decreased cooling capacity. Even if the cooling capacity of the fan decreases, the effect of that on the equipment can be minimized.



Fans with Stall Alarm

Outputs an alarm when the cooling fan stops. Quickly detects defective stops to allow the cooling fan to be replaced.



- ◇ Lineup
 DC Axial Flow Fans
MDS Series → Page F-56
MD Series → Page F-62
MDE Series → Page F-74

◇ Lineup

- AC Axial Flow Fans
MRS Series → Page F-32
MRE Series → See website
 DC Axial Flow Fans
MDS Series → Page F-56
MDA Series → See website
 DC Centrifugal Blowers
MBD Series → Page F-94
 DC Cross Flow Fans
MFD Series → Page F-104

Fans with Pulse Sensor

Outputs a pulse signal while the cooling fan is rotating.

◇ Lineup

- DC Axial Flow Fans
MDS Series → Page F-56
MD Series → Page F-62
 DC Centrifugal Blowers
MBD Series → Page F-94
 DC Cross Flow Fans
MFD Series → Page F-104

Introduction

MRS

AC Input Variable Flow MRS

Axial Flow Fans

MU

MDS/MD

DC Input Long-Life MDE

Centrifugal Blowers

MB

DC Input MBD

Cross Flow Fans

AC Input MF

DC Input MFD

Cooling Module FM

Thermostats

Accessories

Installation

Long Life Axial Flow Fans

You can decrease the number of fans that need replacement by using long-life axial flow fans with an expected life of 100000 hours.

About Long-life Axial Flow Fans

These axial flow fans have an expected life of 100000 hours (about 11 years).

They reduce the increase in bearing temperature, inhibit grease deterioration and improve vibration resistance and shock resistance through bearing enlargement. They also increase the life of circuits and couplers and reduce failure rate. They are designed based on the concept of initial failure so that random failure and wear-out failure will not occur, allowing for 100000 hours of continuous operation or more (survival rate of 90% or higher).

About Expected Life

The 100000 hours of expected life indicates that more than 90% of fans will satisfy the following criteria when used at an ambient temperature of 60°C (140°F).

Criteria: Speed (at rated voltage): Greater than 70% of rated speed

Input Current (at rated voltage): Less than 130% of rated current

Lineup

AC Axial Flow Fans

MRE Series → See website

□ 180 mm – 90 mm Thick (□ 6.30 in. – 2.44 in. Thick)

With/Without Low-Speed Alarm

□ 160 mm – 62 mm Thick (□ 7.09 in. – 3.54 in. Thick)

With/Without Low-Speed Alarm

DC Axial Flow Fans

MDE Series → Page F-74

□ 140 mm – 51 mm Thick (□ 5.51 in. – 2.01 in. Thick)

With Stall Alarm

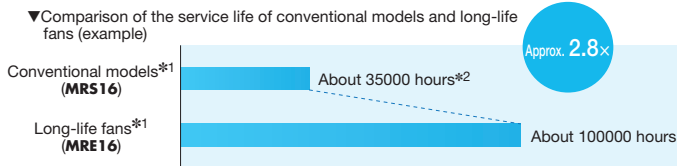
□ 119 mm – 25.4 mm Thick (□ 4.69 in. – 1.00 in. Thick)

With Stall Alarm

The Advantages of Using Long-life Axial Flow Fans

Reduction of Equipment Maintenance

Long-life axial flow fans have an expected life of 100000 hours, so the number of cooling fans that need replacing is decreased compared to conventional models.



*1 The conventional models are **T-MRS16-BTA-G** and **MRS16-BTA**. The long-life fan is **MRE16-BBHG**.

*2 Estimated life of 35000 hours with an ambient temperature of 60°C (140°F). Estimated life is an estimated value calculated using the bearing life-of-grease formula. Estimated life is different for each model.

Equipment That Requires High Reliability

Expected life of 100000 hours or more (continuous operation).

Suitable for applications where continuous operation is required when a failure has had a large effect on systems and equipment.

[Applications]

- Back-up equipment for power failures
- Equipment installed in data centers, etc.
- Plant equipment that is continuously operational

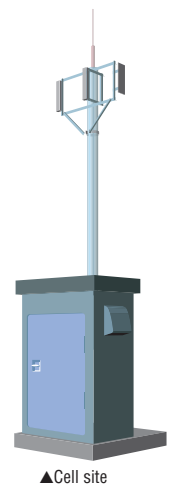
Early Detection of Reduced Air Flow Capacity and Other Abnormalities (Low-Speed Alarm, Stall Alarm)

If the cooling fan is a low-speed alarm type or stall alarm type, early detection and handling of abnormalities is possible. This protects the equipment and entire system from the risk of reduced air flow capacity and stalling due to unexpected troubles, increasing reliability.

Hard-to-service Environments

[Examples of Hard-to-service Environments]

- Equipment that is continuously operational and cannot be stopped
- Areas that are hard to enter
- Equipment that is delivered to and installed in remote locations



Selecting for Efficient Cooling

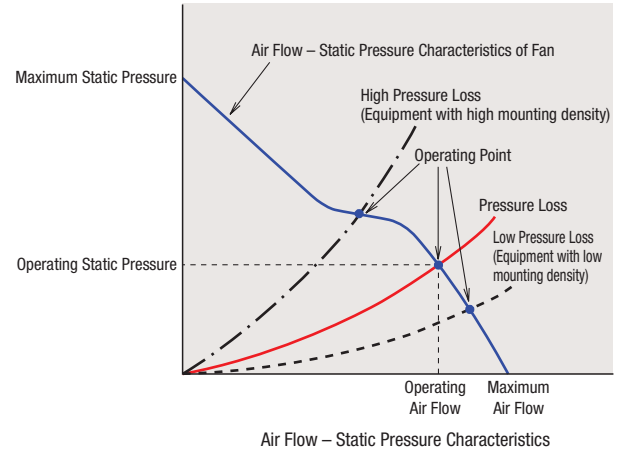
We recommend using different cooling fans based on the varying mounting density inside the equipment. Effective cooling is possible and improvements to energy savings and maintainability can be made at the same time.

The Relationship of Air Flow, Static Pressure, and Equipment Cooling Efficiency

The ideal cooling fan depends on the difference in installation density inside the equipment (air flow difficulty).

- High installation density
 - =Significant pressure loss
 - =Layout with internal structure and equipment that resists air flow, meaning that air cannot flow easily
- Low installation density
 - =Low pressure loss
 - =Internal structure and equipment do not resist air flow, meaning that air can flow easily

Efficient cooling is possible if a cooling fan with high static pressure is used for high installation density and a cooling fan with large air flow is used for low installation density.



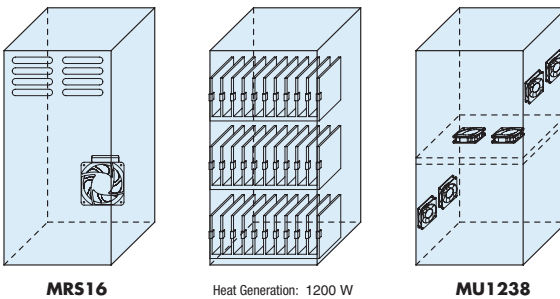
Selecting a Cooling Fan Based on the Installation Density Inside the Equipment

Application Example with High Installation Density

Effective cooling is possible using a large cooling fan offering high static pressure. Using one large axial flow fan is more efficient than using multiple small axial flow fans. They are also suitable for use in equipment with high blower static, high duct air flow, and high installation density.

Applicable Products

AC Axial Flow Fans **MRS Series** → Page F-32, **MRE Series** → See website



High Mounting Density

	MRS16	MU1238
Fan Size	□160 mm – 62 mm Thick □6.30 in. – 2.44 in. Thick	□119 mm – 38 mm Thick □4.69 in. – 1.50 in. Thick
Number of Fans	1	6
Input	37.5 W	92.5 W
Estimated Life	43000 hrs	26000 hrs
Noise	49 dB	51 dB
Temperature Rise in the Enclosure	25°C (45°F)	25°C (45°F)

Application Example of Equipment with Low Installation Density

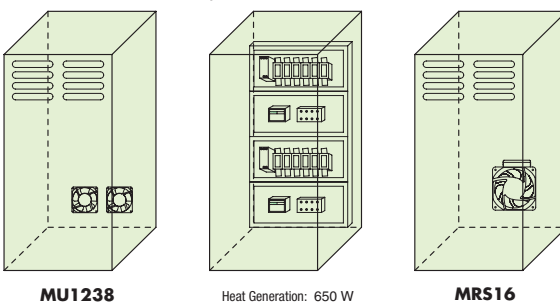
Effective cooling is possible using a compact cooling fan offering a large air flow. Using two small cooling fans keeps noise levels and input current values lower than using one large cooling fan.

Applicable Products

AC Axial Flow Fans **MU Series** → Page F-48

DC Axial Flow Fans **MDS, MD Series** → Page F-56

DC Axial Flow Fans with Low-Speed Alarm **MDA Series** → See website



Low Mounting Density

	MU1238	MRS16
Fan Size	□119 mm – 38 mm Thick □4.69 in. – 1.50 in. Thick	□160 mm – 62 mm Thick □6.30 in. – 2.44 in. Thick
Number of Fans	2	1
Input	31.0 W	37.5 W
Estimated Life	26000 hrs	43000 hrs
Noise	46 dB	49 dB
Temperature Rise in the Enclosure	14°C (25.2°F)	10°C (18°F)

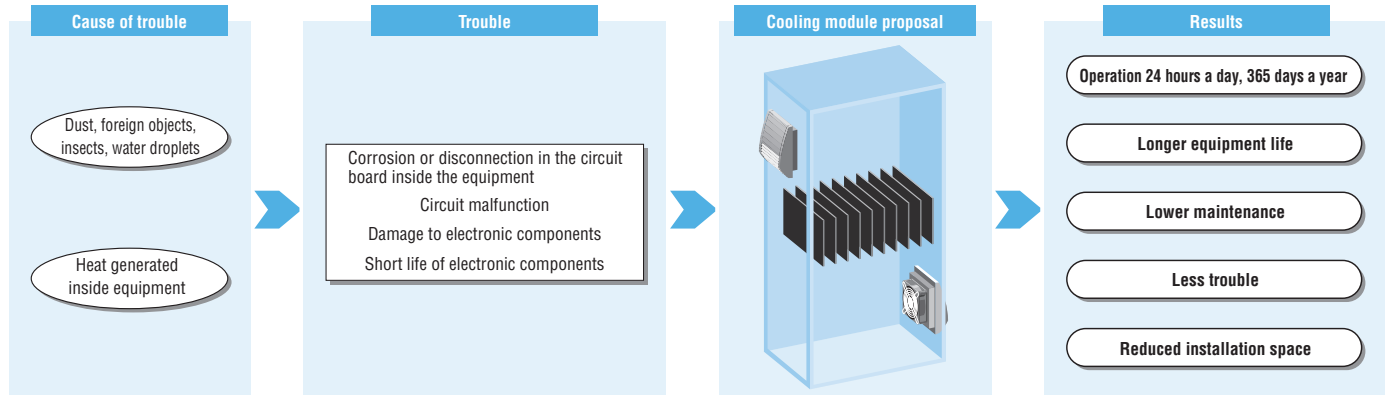
Cooling Module FM Series

In environments where there is a danger of damage to equipment due to dust, insects, water, etc., we recommend the cooling module **FM** Series.

Points of Recommendation

- Longer overall equipment life
- Simplified equipment design
- Lower maintenance costs

The cooling module **FM** Series enables longer life and improved reliability for the overall equipment. They also contribute to energy-saving and the environment preservation.



Applicable Products

Cooling Module **FM** Series IP55/IP43 (Page F-105)

Resin hood type, IP55/IP43

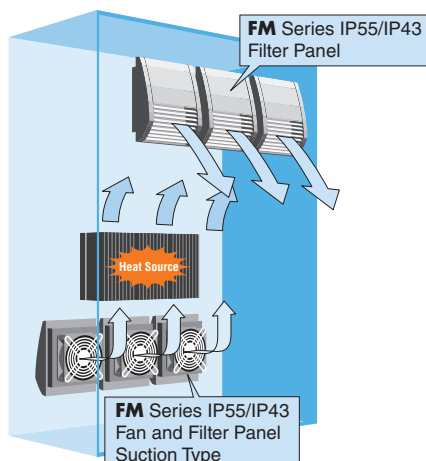
Protects the inside of equipment from powdery dust and water droplets.

• Module dimensions: 209 mm×226 mm~129 mm×134 mm (8.23 in.×8.90 in.~5.08 in.×5.28 in.)



Example of installation of FM Series

"Fan and filter panels" that include a fan and a filter, and "filter panels" that include a filter, are available. Both exhaust type and suction type "fan and filter panels" are available, for a wide variety of applications.

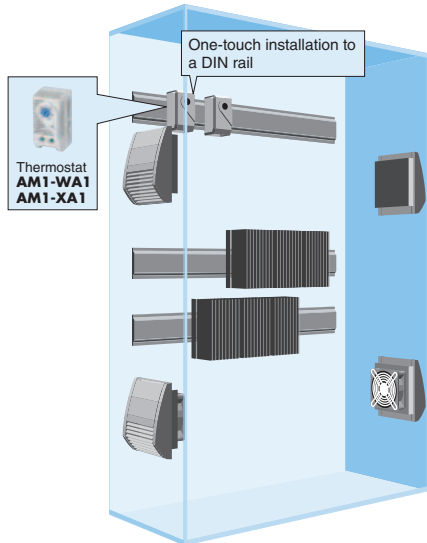


Thermostat

We offer solutions to achieve proper temperature control in enclosures as well as an overall cost reduction through the combined use of a thermostat (AM1-WA1, AM1-XA1) and various AC fans.

Application Example of Thermostats

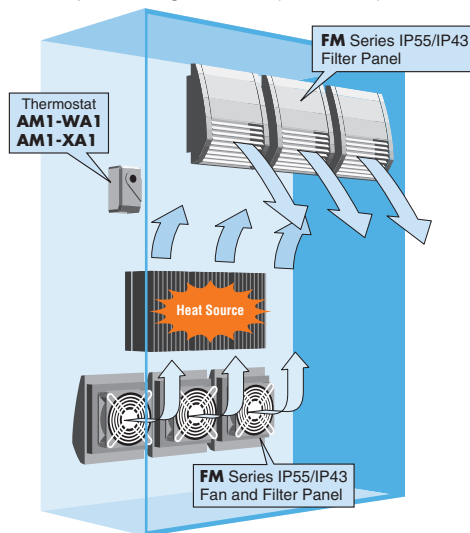
When the inside of the equipment is heated and reaches the thermostat's set temperature, the fans will start automatically. Once the inside of the equipment has cooled to a sufficient level, the fans will stop automatically.



Points of Recommendation

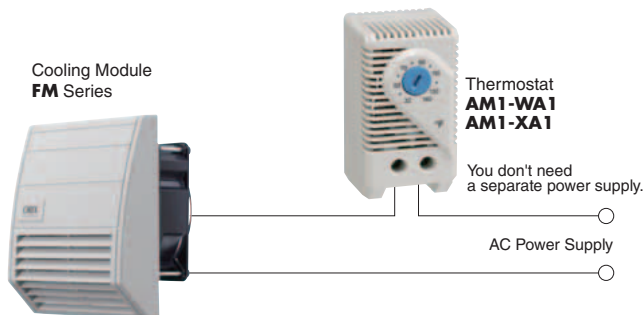
- Lower equipment noise
- Longer overall equipment life
- Lower power consumption
- Lower maintenance costs

- Multiple cooling modules (FM Series) can be controlled.



- We have various other solutions to improve the effectiveness of your equipment. Refer to page F-113 for details.

Connection Example



Thermostats AM1-WA1/AM1-XA1 (Page F-113)



Features of Thermostats (AM1-WA1/AM1-XA1)

- Effective for energy-saving
- Lower equipment noise
- Easy setting
- No need for a separate power supply
- Conforms to DIN rail
- Conforms to safety standards
- Compact size: 33 mm (W)×60 mm (H)×35 mm (D)
[1.30 in. (W)×2.36 in. (H)×1.38 in. (D)]

Introduction	
MRS	AC Input Variable Flow
MU	Axial Flow Fans
MDS/MD	DC Input Long-Life
MB	Centrifugal Blowers
MBD	DC Input
MF	AC Input
MFD	DC Input
FM	Cross Flow Fans
	Cooling Module
	Thermostats
	Accessories
	Installation

Fan Kit

Various accessories will help you improve the safety and utility of fans.

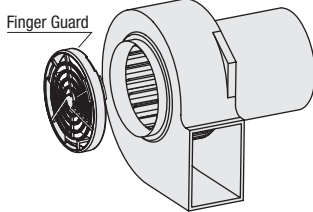
We recommend our fan kits, which combine the fan and necessary accessories in convenient package.

Configuration of Fan Kit Products

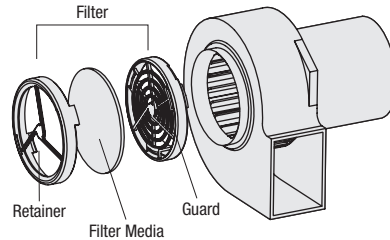
● MB Series Centrifugal Blowers

We offer the following accessories:

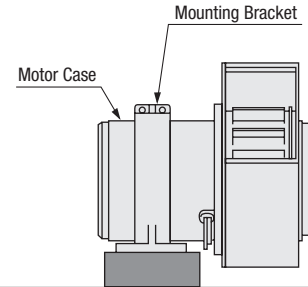
● Finger Guards → Page F-118



● Filters → Page F-120



● Mounting Brackets → Page F-125



These accessories and mounting screws are supplied with the fan.

◇ MB Series Fan Kit Products



● Centrifugal Blower **MB1255-B** and Accessories **MB1255-B** fan, finger guard **FGB12** and mounting bracket **PAS6A**

● **MB1255-B** Fan Kit Product **T-MB1255-B-GA**

Mounting screws are provided in addition to finger guard and mounting bracket.

All necessary items are ordered at the same time, so you can start using the product immediately after delivery.

● Please specify **T-MB1255-B-FA** for use with filter **FLB12**.

Types of Fan Kit Products

● AC Axial Flow Fans

MRS Series fan kit*

→ Page F-32~F-47

MU Series fan kit*

→ Page F-48~F-55



● DC Axial Flow Fans

MDS, **MD** and **MDE** Series fan kit

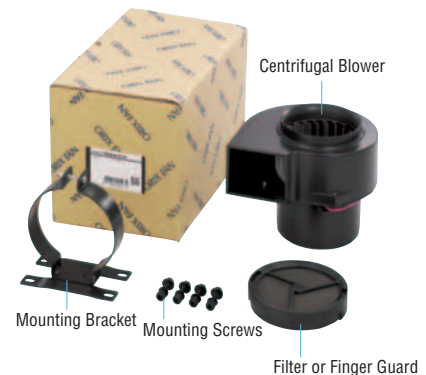
→ Page F-56~F-77



● AC Centrifugal Blowers, DC Centrifugal Blowers

MB and **MBD** Series fan kit

→ Page F-82~F-99



*Filter is included with some products of the **MRS** Series fan kit.

Plug cords are not supplied with the fan kit products of the **MRS** Series and the **MU825** types.

How to Read Specifications

Introduction

MRS

AC Input
Variable Flow
MRS

Axial Flow Fans

MU

DC Input
MDS/MDLong-Life
MDE

Centrifugal Blowers

MB

DC Input
MBD

Cross Flow Fans

MF

DC Input
MFDCooling
Module

FM

Thermostats

Accessories

Installation

How to Read Specifications

Specifications Table (Example) **MRS Series**/□200 mm – 90 mm Thick (□7.87 in. – 3.54 in. Thick)

Model		① Voltage	② Frequency	③ Current	④ Input	⑤ Speed	⑥ Max. Air Flow		⑦ Max. Static Pressure		⑧ Noise Level	⑨ Capacitor
Low-Speed Alarm, Electronic Alarm Type (Alarm specifications: ⑩)	Standard Type	VAC	Hz	A	W	r/min	m ³ /min	CFM	Pa	inH ₂ O	dB (A)	μF
MRS20-BM	MRS20-BUL	Single-Phase 100	50	0.8	75	2850	13.2	466	221	0.886	56	6.0
		Single-Phase 100	60	1.0	95	3350	15.5	547	186	0.746	60	
		Single-Phase 110	60	1.0	95	3400	15.5	547	255	1.02	61	
		Single-Phase 115	60	1.0	95	3400	15.5	547	265	1.06	61	
MRS20-DM	MRS20-DUL	Single-Phase 200	50	0.4	75	2850	13.2	466	221	0.886	56	6.0
		Single-Phase 200	60	0.5	95	3350	15.5	547	186	0.746	60	
		Single-Phase 230	60	0.5	95	3400	15.5	547	265	1.06	61	
MRS20-TM	MRS20-TUL	Three-Phase 200	50	0.4	75	2850	13.2	466	221	0.886	56	-
		Three-Phase 200	60	0.4	95	3350	15.5	547	265	1.06	60	
		Three-Phase 220	60	0.4	95	3400	15.5	547	265	1.06	61	
		Three-Phase 230	60	0.4	95	3400	15.5	547	265	1.06	61	

- ① Voltage: Power supply voltage needed to operate the fans. Varies with the type of fan, single-phase 100 VAC, 110 VAC, 115 VAC, single-phase 200 VAC, 220 VAC, 230 VAC and three-phase 200 VAC, 220 VAC, 230 VAC for AC power supply, and 5 VDC, 12 VDC, 24 VDC, 48 VDC for DC power supply.
- ② Frequency: For AC fans, speed varies depending on the frequency
- ③ Current: The current when the fan is at rated speed
- ④ Input Power: The input power when the fan is at rated speed
- ⑤ Speed: The fan's rated speed
- ⑥ Max. Air Flow: Maximum air flow that the fan can produce at rated speed*¹
- ⑦ Max. Static Pressure: Maximum static pressure that the fan can produce at rated speed*²
- *1, 2 Values for maximum air flow and maximum static pressure are measured by the double chamber method.
- ⑧ Noise Level: Noise level when the fan is at rated speed*³
- *3 Noise level is measured in the A-weighted sound pressure level, at a distance of 1 m (3.3 ft.) from the intake side of fan.
- ⑨ Capacitor: Capacitor is required to operate single-phase 100 VAC, 110 VAC, 115 VAC and single-phase 200 VAC, 220 VAC, 230 VAC fans (Capacitor is included or built-in with products.)
- ⑩ Alarm Specifications: Indicate the type of fan with alarm
Types of fan alarms include: stall alarm (electronic alarm type), low-speed alarm (contact alarm type, electronic alarm type), pulse sensor type.
There are ten alarm specifications. (These are described by the numbers in () in the specifications tables.)
These numbers correspond to the numbers in the "specifications for fans with alarms" (Pages F-21~F-23). Refer to these pages for details.

Overheat Protection

Built-in thermal protector

If the fan overheats and the internal temperature of windings reaches the specified temperature, the thermal protector (automatic return type) is activated and the fan is stopped. Be sure to turn the fan off before inspecting.

Impedance protected

These products are impedance protected to prevent the windings from burning.

Built-in overheat protection circuit

Overheat protection circuit is installed to prevent the windings from burning.

Fan Operation

Do not touch the fan blades when the fan is in operation. Use a finger guard (accessory) for protection.

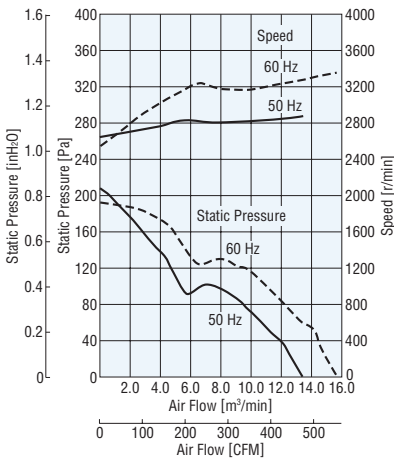
(A convenient fan kit is also available. → Page F-18)

How to Read Air Flow – Static Pressure Characteristics

The air flow – static pressure characteristics diagram indicates the static pressure value for a given air flow, with air flow on the horizontal axis and static pressure on the vertical axis.

In the diagram below, an air flow of 13.2 m³/min (466 CFM) (at 50 Hz) corresponds to a condition with no pressure loss [static pressure 0 Pa (0 CFM)], which is the air flow value the fan can produce (maximum air flow).

Also, a static pressure of 221 Pa (0.886 inH₂O) (at 50 Hz) is the maximum static pressure the fan can produce.



● For details, refer to page G-83 in technical reference.