G

# Cooling Fans

# Cooling Fans




Overview of Cooling Fans ····· G-2

Axial Flow Fans ····· G-17

AC Input
- Low-Power Consumption **EMU Series** ····· G-22
- Compact Size **MU Series** ····· G-26
- Large Size, Large Air Flow **MRS Series** ····· G-36
- Long-Life **MRE Series** ····· G-52

DC Input
- **MDS Series, MD Series** ····· G-56
- Low Speed Alarm **MDA Series** ····· G-76
- Variable Flow **MDV Series** ····· G-80
- Long-Life **MDE Series** ····· G-82
- Splash Proof **MDP Series** ····· G-84

Centrifugal Blowers ····· G-87

- **AC Input MB Series** ····· G-89
- **DC Input MBD Series** ····· G-90

Cross Flow Fans ····· G-91

- **AC Input MF Series** ····· G-93
- **DC Input MFD Series** ····· G-93

Enclosure Fan Modules ····· G-95

Thermostat ····· G-103

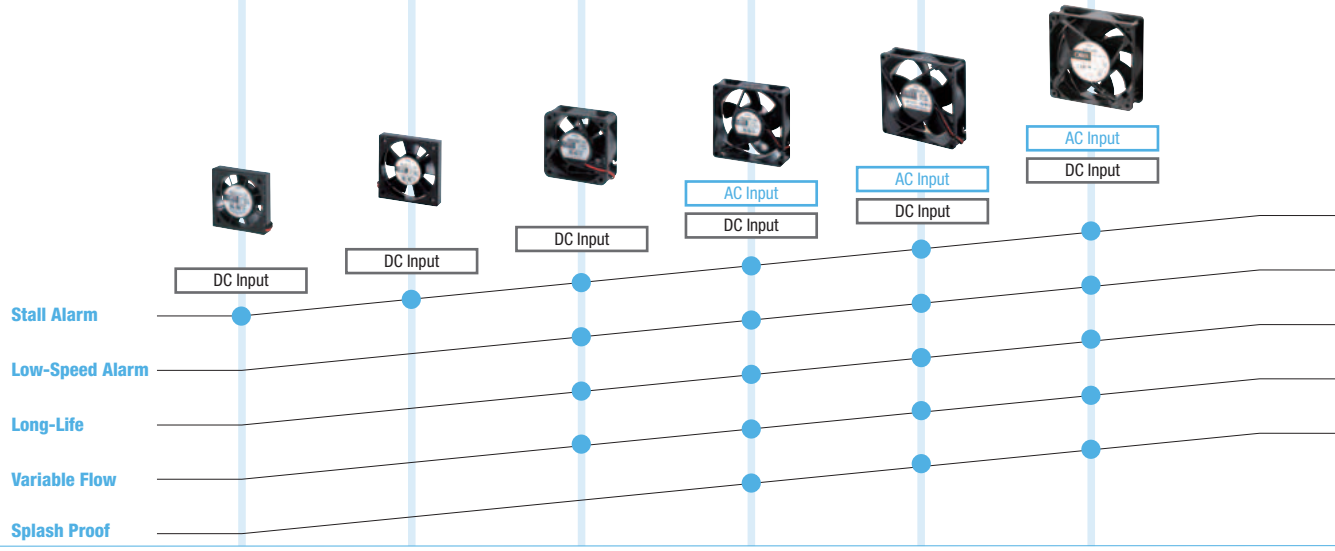
Accessories ····· G-107

Installations ····· G-115

# Product Line of Cooling Fans

## Axial Flow Fans

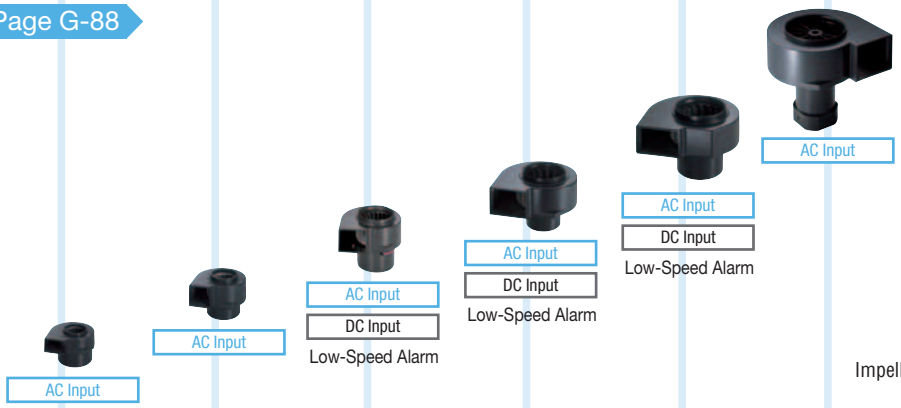
Page G-18




□42 (□1.65) □52 (□2.05) □60 (□2.36) □62 (□2.44) □80 (□3.15) □92 (□3.62) □119 (□4.69) □120 (□4.72)

## Centrifugal Blowers

Page G-88



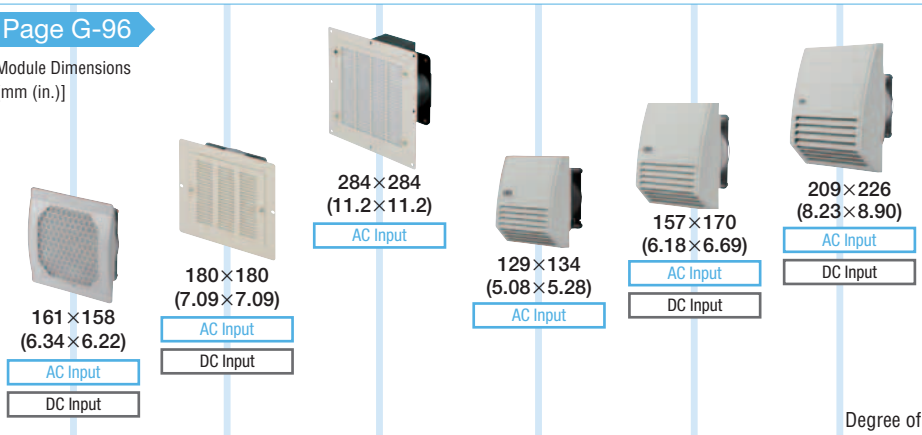

Impeller Diameter [mm (in.)]

ϕ50 (ϕ1.97) ϕ60 (ϕ2.36) ϕ80 (ϕ3.15) ϕ100 (ϕ3.94) ϕ120 (ϕ4.72) ϕ160 (ϕ6.30)

## Enclosure Fan Modules

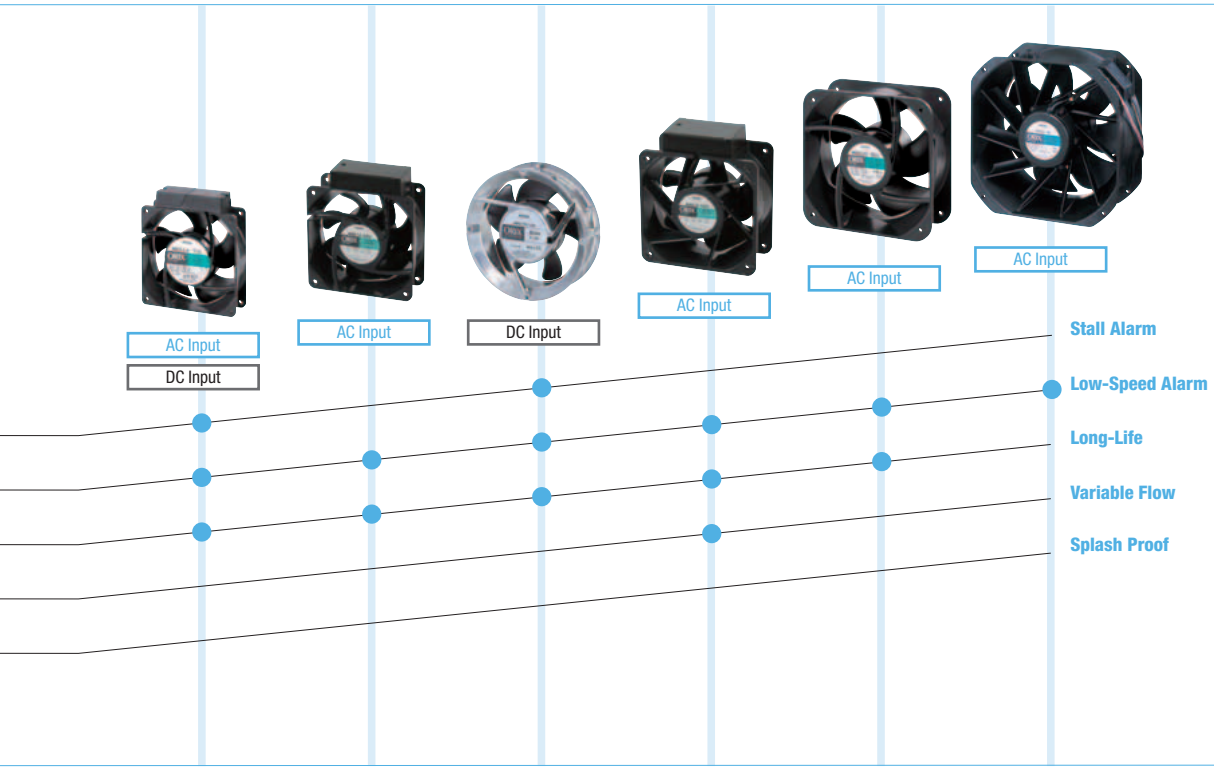
Page G-96

Module Dimensions [mm (in.)]




Degree of Protection (IP)

IP2X IP4X IP4X IP43/55 IP43/55 IP43/55

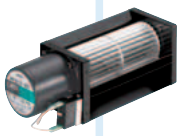



Frame Size [mm (in.)]

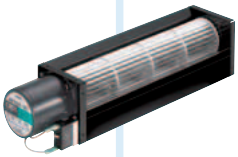
□140 (□5.51) □160 (□6.30) ϕ172 (ϕ6.77) □180 (□7.09) □200 (□7.87) □250 (□9.84)

## Cross Flow Fans

Page G-92



AC Input
DC Input
Low-Speed Alarm



AC Input
DC Input
Low-Speed Alarm

Impeller Length [mm (in.)]

150 (5.91) 300 (11.81)

## Thermostat

Page G-104

Fan Thermostat

## Accessories

Page G-108

Finger Guards

Filters

Screens

Plug Cords

# Overview of Cooling Fans

## About Fans and Thermal Management

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 cooling fan products centered on thermal management to meet these requirements.

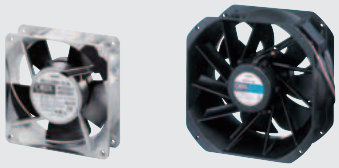
## Applications and Classifications

### Ventilation, Cooling, Drying, and Suction

#### Axial Flow Fans

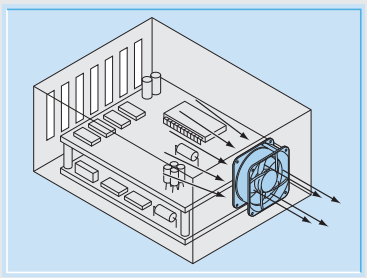
A large air flow is feature of axial flow fans.

➜ Page G-18



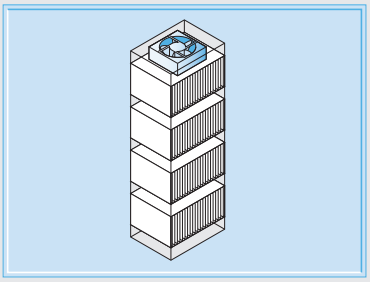
**●Device Ventilation and Cooling**

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.



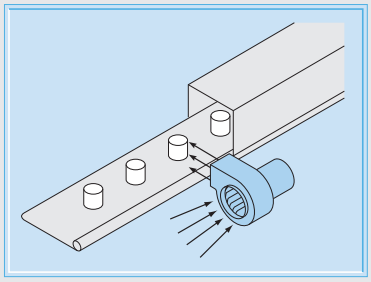
#### Centrifugal Blowers

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

➜ Page G-88

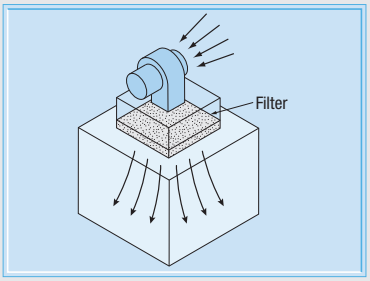
**●Air-Blow Cooling or Drying**

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



**●Cooling with High Static Pressure**

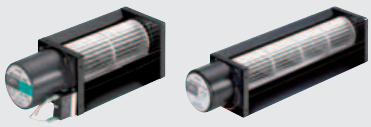
The high static pressure of centrifugal blowers makes them suitable for cooling used together with thick filters that are subject to significant pressure losses.




#### Cross Flow Fans

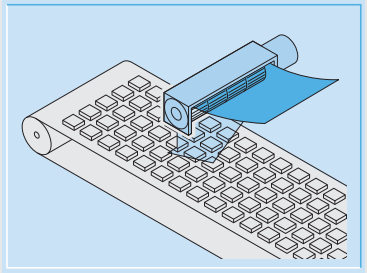
A wide, uniform air flow is a feature of cross flow fans.

➜ Page G-92



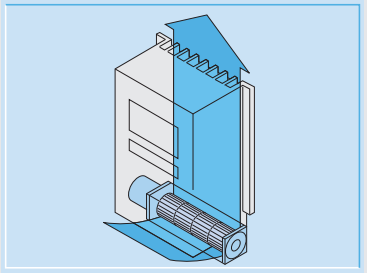
**●Uniform Cooling or Drying**

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



**●Cooling of Long and Thin Space**

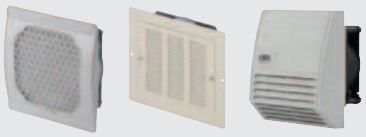
Suitable for air-blow cooling of long and thin spaces, such as where electronic devices are installed.



## Measures for Preventing Water Droplets and Dust from Entering

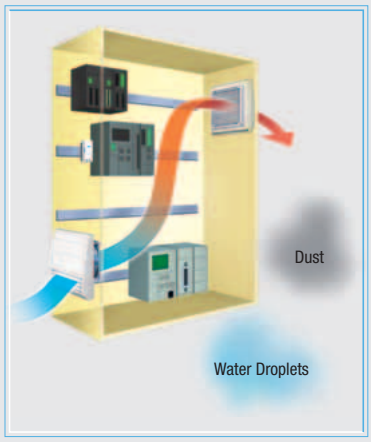
### Enclosure Fan Modules

➜ Page G-96



**●Ventilation and Cooling Inside Control Box**

Suitable for ventilation and cooling inside an enclosure in an environment where powdery dust is mixed in with the air. Improves the reliability of the entire enclosure cabinet.




## Automatically Turning the Cooling Fan ON/OFF

### Thermostat

➜ Page G-104
● Fan Thermostat

**●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.

## Product Line

# Axial Flow Fans

## AC Input

Low-Power Consumption
### EMU Series

Frame Size [mm (in.)] □120 (□4.72)
Service Life: 60,000 hours
Single-Phase 100-240 VAC (50/60 Hz)
Lightweight
➜ Page G-22

Compact Size
### MU Series

Frame Size [mm (in.)] □80 (□3.15), □92 (□3.62), □119 (□4.69)
➜ Page G-26

Large Size, Large Air Flow
### MRS Series
Low-Speed Alarm

Frame Size [mm (in.)] □140 (□5.51), □160 (□6.30), □180 (□7.09), □200 (□7.87), □250 (□9.84)
➜ Page G-36

Long-Life
### MRE Series
Long-Life Low-Speed Alarm

Frame Size [mm (in.)] □160 (□6.30), □180 (□7.09), □200 (□7.87)
Long-Life fans have an expected life of 100,000 hours.
➜ Page G-52

## DC Input

### MDS Series, MD Series
Stall Alarm

Frame Size [mm (in.)] □42 (□1.65), □52 (□2.05), □60 (□2.36), □62 (□2.44), □80 (□3.15), □92 (□3.62), □119 (□4.69), □120 (□4.72), □140 (□5.51), ϕ172 (ϕ6.77)
➜ Page G-56

Low Speed Alarm
### MDA Series
Low-Speed Alarm

Frame Size [mm (in.)] □62 (□2.44), □80 (□3.15), □92 (□3.62), □119 (□4.69), □140 (□5.51), ϕ172 (ϕ6.77)
➜ Page G-76

Variable Flow
### MDV Series
Variable Flow Pulse Sensor

Frame Size [mm (in.)] □60 (□2.36), □80 (□3.15), □92 (□3.62), □120 (□4.72)
Air flow and static pressure can be adjusted via PWM control.
➜ Page G-80

Long-Life
### MDE Series
Long-Life Stall Alarm

Frame Size [mm (in.)] □60 (□2.36), □80 (□3.15), □92 (□3.62), □119 (□4.69), □140 (□5.51), ϕ172 (ϕ6.77)
Long-Life fans have an expected life of 100,000 hours.
➜ Page G-82

Splash Proof
### MDP Series
Stall Alarm

Frame Size [mm (in.)] □80 (□3.15), □92 (□3.62), □119 (□4.69)
Conforms to the IEC Standards IP55 rating and can be used in locations that are splashed with water.
➜ Page G-84

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

→ For details about each function, refer to the Description of Functions on G-8.

# Centrifugal Blowers

## AC Input

### MB Series

Impeller Diameter [mm (in.)] ϕ50 (ϕ1.97) ϕ60 (ϕ2.36) ϕ80 (ϕ3.15) ϕ100 (ϕ3.94) ϕ120 (ϕ4.72) ϕ160 (ϕ6.30)

→ Page G-88

## DC Input

### MBD Series

Low-Speed Alarm

Impeller Diameter [mm (in.)] ϕ80 (ϕ3.15) ϕ100 (ϕ3.94) ϕ120 (ϕ4.72)

→ Page G-88

# Cross Flow Fans

## AC Input

### MF Series

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

→ Page G-92

## DC Input

### MFD Series

Low-Speed Alarm

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

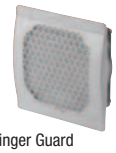
→ Page G-92

# Enclosure Fan Modules

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.

→ Page G-96



Finger Guard
IP2X Type

Slit Metal Plate
IP4X Type

Dust and Water Resistant
IP43·IP55 Type

# Thermostat

Switches that detect the ambient temperature and automatically turn the cooling fan ON/OFF.
The fans can be operated only when necessary for energy-saving control.

→ Page G-104

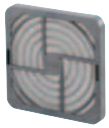
Fan Thermostat
**AM2-XA1**

# Accessories

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

- Finger Guards
- Filters
- Screens
- Plug Cords

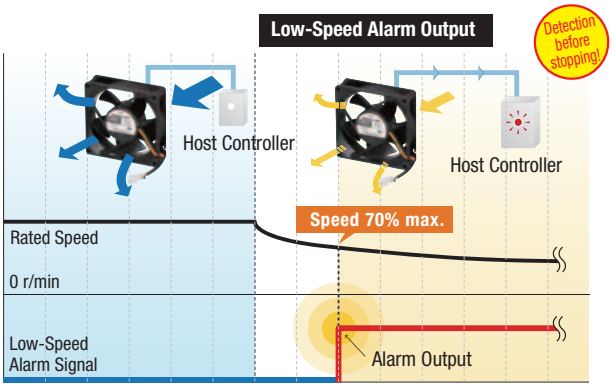
→ Page G-108



## Description of Functions

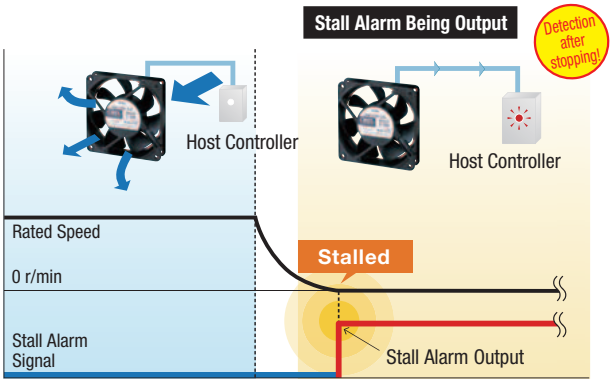
### Fans with Low-Speed Alarms

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 thus minimizing the effect on the equipment.



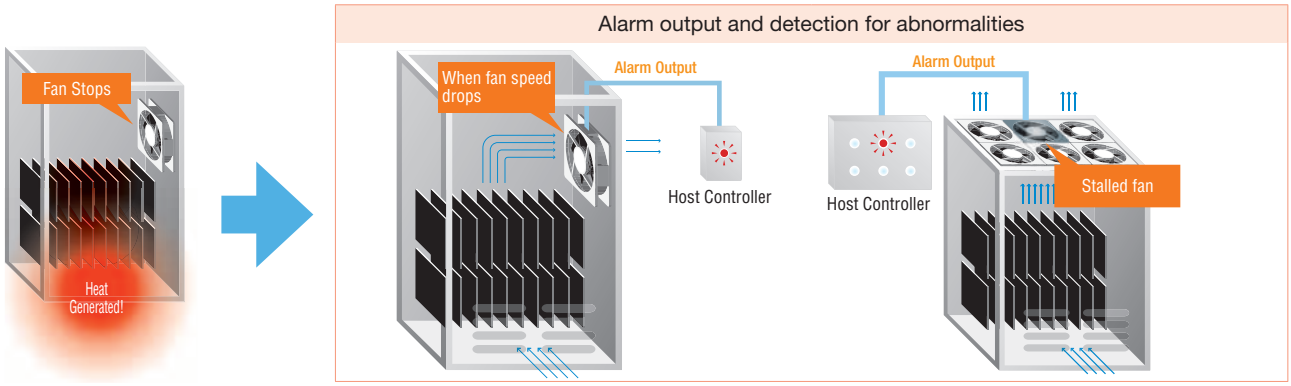

### Fans with Stall Alarm

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




◇**Application Example**

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.



## Long-Life

A long-life axial flow fan has an expected service life of 100,000 hours (Approx. 11 years).
In addition to the reduction of the temperature rise of the bearings, grease deterioration is suppressed. Furthermore, vibration resistance and shock resistance have been improved by using larger bearings. Measures have been taken for longer service life of circuit/coupling and reduction of failure rate. The products are designed to avoid not only initial failure but also random failure and abrasion failure, so that continuous operation of 100,000 hours or more (retention rate of 90% or more) is achieved.

### Expected Service Life

The expected service life indicates that at least 90% of the fans will satisfy the following criteria when the acceleration test is performed at an ambient temperature of 60˚C (140°F).

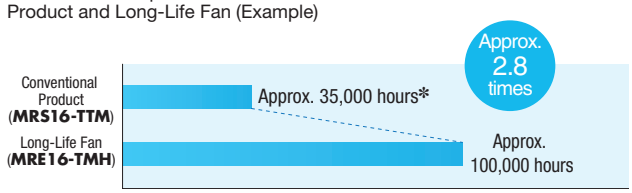
**Criteria**

- Speed (at rated voltage): 70% or more of rated value
- Input current (at rated voltage): 130% or less of rated value

### ◇Lower Maintenance Costs and Overall Costs

A long-life axial flow fan has an expected service life of 100,000 hours. Compared to conventional products, they require fewer replacements, resulting in reduction of the overall costs.

▼Service Life Comparison between Conventional Product and Long-Life Fan (Example)




*Estimated life is 35,000 hours when the ambient temperature is 60˚C (140°F). The estimated life is an estimated value calculated using the formula for the life of the bearing grease. The estimated life varies depending on the product.

# Maximum Air Flow and Maximum Static Pressure

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

| | Max. Air Flow [$m^3$/min (CFM)] For 60 Hz | Frame Size [mm (in.)] | Thickness [mm (in.)] | Type | Page |
|---|---|---|---|---|---|
| AC Axial Flow Fans | 0.55 (19.4) | □80 (□3.15) | 25 (0.98) | MU825 | G-28 |
| | 1.10 (38.8) | □92 (□3.62) | 25 (0.98) | MU925 | G-30 |
| | 1.9 (67.1) | □119 (□4.69) | 25 (0.98) | MU1225 | G-32 |
| | 3.0 (106) | □119 (□4.69) | 38 (1.50) | MU1238 | G-34 |
| | 3.0 (106) | □120 (□4.72) | 38 (1.50) | EMU1238 | G-24 |
| | 5.0 (177) | □140 (□5.51) | 47 (1.85) | MRS14 | G-38 |
| | 7.3 (258) | □160 (□6.30) | 62 (2.44) | MRS16 | G-40 |
| | | | | MRE16 | G-54 |
| | 12.8 (452) | □180 (□7.09) | 90 (3.54) | MRS18 | G-44 |
| | | | | MRE18 | G-54 |
| | 15.5 (547) | □200 (□7.87) | 90 (3.54) | MRS20 | G-48 |
| | | | | MRE20 | G-54 |
| | 25 (883) | □250 (□9.84) | 120 (4.72) | MRS25 | G-50 |
| DC Axial Flow Fans | 0.18 (6.35) | □42 (□1.65) | 10 (0.39) | MDS410 | G-58 |
| | 0.27 (9.53) | □52 (□2.05) | 10 (0.39) | MDS510 | G-60 |
| | 0.50 (17.7) | □62 (□2.44) | 25.4 (1.00) | MD625 | G-62 |
| | | | | MDA625 | G-78 |
| | 0.53 (18.7) | □60 (□2.36) | 25 (0.98) | MDE625 | G-83 |
| | 1.00 (35.3) | □80 (□3.15) | 25.4 (1.00) | MD825 | G-64 |
| | | | | MDA825 | G-78 |
| | 1.03 (36.4) | □80 (□3.15) | 25 (0.98) | MDP825 | G-85 |
| | 1.06 (37.1) | □60 (□2.36) | 25 (0.98) | MDS625 | G-62 |
| | | □80 (□3.15) | 25 (0.98) | MDE825 | G-83 |
| | 1.21 (42.7) | □60 (□2.36) | 25 (0.98) | MDV625 | G-81 |
| | 1.30 (45.9) | □92 (□3.62) | 25.4 (1.00) | MD925 | G-66 |
| | | | | MDA925 | G-78 |
| | 1.38 (48.7) | □92 (□3.62) | 25 (0.98) | MDE925 | G-83 |
| | 1.45 (51.2) | □92 (□3.62) | 25 (0.98) | MDP925 | G-85 |
| | 1.5 (53.0) | □80 (□3.15) | 25 (0.98) | MDS825 | G-64 |
| | 1.93 (68.2) | □92 (□3.62) | 25.2 (0.99) | MDS925 | G-66 |
| | 2.12 (74.9) | □80 (□3.15) | 25.2 (0.99) | MDV825 | G-81 |
| | 2.20 (77.7) | □92 (□3.62) | 25.2 (0.99) | MDV925 | G-81 |
| | 2.5 (88.3) | □119 (□4.69) | 25.4 (1.00) | MD1225 | G-68 |
| | 2.7 (95.3) | □119 (□4.69) | 25.4 (1.00) | MDS1225 | G-68 |
| | | | | MDA1225 | G-78 |
| | | | | MDE1225 | G-83 |
| | 2.8 (98.9) | □119 (□4.69) | 38 (1.50) | MDP1238 | G-85 |
| | 3.88 (137) | □119 (□4.69) | 38 (1.50) | MDS1238 | G-70 |
| | | | | MDA1238 | G-78 |
| | | | | MDE1238 | G-83 |
| | 5.8 (205) | □140 (□5.51) | 51 (2.01) | MDS1451 | G-72 |
| | | | | MDA1451 | G-78 |
| | | | | MDE1451 | G-83 |
| | 6.0 (212) | ϕ172 (ϕ6.77) | 51 (2.01) | MDS1751 | G-74 |
| | | | | MDA1751 | G-78 |
| | 6.35 (224) | □120 (□4.72) | 38 (1.50) | MDS1238H | G-70 |
| | | | | MDV1238 | G-81 |
| | 6.4 (226) | ϕ172 (ϕ6.77) | 51 (2.01) | MDE1751(F) | G-83 |
| | 9.9 (350) | | | MDS1751(F)H | G-74 |

| | Max. Air Flow [$m^3$/min (CFM)] For 60 Hz | Impeller Diameter [mm (in.)] | Power Supply | Type | Page |
|---|---|---|---|---|---|
| Centrifugal Blowers | 0.25 (8.83) | ϕ50 (ϕ1.97) | AC Input | MB520 | G-89 |
| | 0.49 (17.3) | ϕ60 (ϕ2.36) | | MB630 | G-89 |
| | 1.8 (63.5) | ϕ80 (ϕ3.15) | | MB840 | G-89 |
| | 2.6 (91.8) | ϕ100 (ϕ3.94) | | MB1040 | G-89 |
| | 5.1 (180) | ϕ120 (ϕ4.72) | | MB1255 | G-89 |
| | 9.0 (318) | ϕ160 (ϕ6.30) | | MB1665 | G-89 |
| | 1.45 (51.2) | ϕ80 (ϕ3.15) | DC Input | MBD8 | G-90 |
| | 1.95 (68.8) | ϕ100 (ϕ3.94) | | MBD10 | G-90 |
| | 3.0 (106) | ϕ120 (ϕ4.72) | | MBD12 | G-90 |
| | Max. Air Flow [$m^3$/min (CFM)] For 60 Hz | Impeller Length [mm (in.)] | Power Supply | Type | Page |
| Cross Flow Fans | 4.1 (145) | 150 (5.91) | AC Input | MF915 | G-93 |
| | 6.8 (240) | 300 (11.81) | | MF930 | G-93 |
| | 3.0 (106) | 150 (5.91) | DC Input | MFD915 | G-93 |
| | 5.2 (184) | 300 (11.81) | | MFD930 | G-93 |

## Maximum Static Pressure

| | Max. Static Pressure [Pa ($inH_2O$)] For 60 Hz | Frame Size [mm (in.)] | Thickness [mm (in.)] | Type | Page |
|---|---|---|---|---|---|
| AC Axial Flow Fans | 49 (0.196) | □80 (□3.15) | 25 (0.98) | MU825 | G-28 |
| | 59 (0.237) | □92 (□3.62) | 25 (0.98) | MU925 | G-30 |
| | 44 (0.176) | □119 (□4.69) | 25 (0.98) | MU1225 | G-32 |
| | 81 (0.325) | □119 (□4.69) | 38 (1.50) | MU1238 | G-34 |
| | 84 (0.337) | □120 (□4.72) | 38 (1.50) | EMU1238 | G-24 |
| | 109 (0.437) | □140 (□5.51) | 47 (1.85) | MRS14 | G-38 |
| | 157 (0.63) | □160 (□6.30) | 62 (2.44) | MRS16 | G-40 |
| | | | | MRE16 | G-54 |
| | 245 (0.982) | □180 (□7.09) | 90 (3.54) | MRS18 | G-44 |
| | | | | MRE18 | G-54 |
| | 265 (1.06) | □200 (□7.87) | 90 (3.54) | MRS20 | G-48 |
| | | | | MRE20 | G-54 |
| | 410 (1.65) | □250 (□9.84) | 120 (4.72) | MRS25 | G-50 |

## DC Axial Flow Fans

| Max. Static Pressure [Pa ($inH_2O$)] For 60 Hz | Frame Size [mm (in.)] | Thickness [mm (in.)] | Type | Page |
|---|---|---|---|---|
| 35.3 (0.141) | □80 (□3.15) | 25 (0.98) | **MDP825** | G-85 |
| 39.2 (0.157) | □80 (□3.15) | 25 (0.98) | **MDE825** | G-83 |
| 40.2 (0.161) | □60 (□2.36) | 25 (0.98) | **MDE625** | G-83 |
| 43 (0.172) | □119 (□4.69) | 25.4 (1.00) | **MD1225** | G-68 |
| 44 (0.176) | □92 (□3.62) | 25 (0.98) | **MDP925** | G-85 |
| 45.1 (0.181) | □92 (□3.62) | 25 (0.98) | **MDE925** | G-83 |
| 49 (0.196) | □62 (□2.44) | 25.4 (1.00) | **MD625** | G-62 |
| | | | **MDA625** | G-78 |
| 49 (0.196) | □80 (□3.15) | 25.4 (1.00) | **MD825** | G-64 |
| | | | **MDA825** | G-78 |
| 49 (0.196) | □92 (□3.62) | 25.4 (1.00) | **MD925** | G-66 |
| | | | **MDA925** | G-78 |
| 54 (0.217) | □52 (□2.05) | 10 (0.39) | **MDS510** | G-60 |
| 70 (0.281) | □119 (□4.69) | 25.4 (1.00) | **MDS1225** | G-68 |
| | | | **MDA1225** | G-78 |
| | | | **MDE1225** | G-83 |
| | | 38 (1.50) | **MDP1238** | G-85 |
| 80.4 (0.323) | □80 (□3.15) | 25 (0.98) | **MDS825** | G-64 |
| 81 (0.330) | □92 (□3.62) | 25.2 (0.99) | **MDS925** | G-66 |
| 86 (0.345) | □42 (□1.65) | 10 (0.39) | **MDS410** | G-58 |
| 105 (0.421) | □92 (□3.62) | 25.2 (0.99) | **MDV925** | G-81 |
| 120.8 (0.484) | □119 (□4.69) | 38 (1.50) | **MDE1238** | G-83 |
| 130 (0.521) | □140 (□5.51) | 51 (2.01) | **MDS1451** | G-72 |
| | | | **MDA1451** | G-78 |
| | | | **MDE1451** | G-83 |
| 135 (0.542) | □119 (□4.69) | 38 (1.50) | **MDS1238** | G-70 |
| | | | **MDA1238** | G-78 |
| 137 (0.549) | ϕ172 (ϕ6.77) | 51 (2.01) | **MDS1751** | G-74 |
| | | | **MDA1751** | G-78 |
| | | | **MDE1751(F)** | G-83 |
| 155 (0.622) | □60 (□2.36) | 25 (0.98) | **MDS625** | G-62 |
| 173 (0.694) | □80 (□3.15) | 25.2 (0.99) | **MDV825** | G-81 |
| 224 (0.899) | □60 (□2.36) | 25 (0.98) | **MDV625** | G-81 |
| 308 (1.237) | ϕ172 (ϕ6.77) | 51 (2.01) | **MDS1751(F)H** | G-74 |
| 360 (1.450) | □120 (□4.72) | 38 (1.50) | **MDS1238H** | G-70 |
| | | | **MDV1238** | G-81 |

## Centrifugal Blowers

| Max. Static Pressure [Pa ($inH_2O$)] For 60 Hz | Impeller Diameter [mm (in.)] | Power Supply | Type | Page |
|---|---|---|---|---|
| 55 (0.221) | ϕ50 (ϕ1.97) | AC Input | **MB520** | G-89 |
| 79 (0.317) | ϕ60 (ϕ2.36) | | **MB630** | G-89 |
| 226 (0.906) | ϕ80 (ϕ3.15) | | **MB840** | G-89 |
| 284 (1.14) | ϕ100 (ϕ3.94) | | **MB1040** | G-89 |
| 441 (1.77) | ϕ120 (ϕ4.72) | | **MB1255** | G-89 |
| 686 (2.75) | ϕ160 (ϕ6.30) | | **MB1665** | G-89 |
| 196 (0.786) | ϕ80 (ϕ3.15) | DC Input | **MBD8** | G-90 |
| 294 (1.18) | ϕ100 (ϕ3.94) | | **MBD10** | G-90 |
| 372 (1.49) | ϕ120 (ϕ4.72) | | **MBD12** | G-90 |

## Cross Flow Fans

| Max. Static Pressure [Pa ($inH_2O$)] For 60 Hz | Impeller Length [mm (in.)] | Power Supply | Type | Page |
|---|---|---|---|---|
| 106 (0.425) | 300 (11.81) | AC Input | **MF930** | G-93 |
| 132 (0.529) | 150 (5.91) | | **MF915** | G-93 |
| 83 (0.333) | 300 (11.81) | DC Input | **MFD930** | G-93 |
| 98 (0.393) | 150 (5.91) | | **MFD915** | G-93 |

# How to Read Specifications

## How to Read Specifications

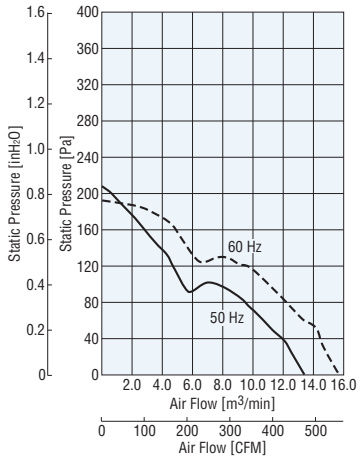
Specifications Table (Example) **MRS** Series/□200 mm – 90 mm Thick (□7.87 in. – 3.54 in. Thick)

| ⑩ Product Name: Standard Type | ⑩ Product Name: Low-Speed Alarm, Electronic Alarm Type (Alarm specifications: ②) | ① Voltage VAC | ② Frequency Hz | ③ Current A | ④ Input W | ⑤ Speed r/min | ⑥ Max. Air Flow $m^3$/min | ⑥ Max. Air Flow CFM | ⑦ Max. Static Pressure Pa | ⑦ Max. Static Pressure $inH_2O$ | ⑧ Noise Level dB (A) | ⑨ Capacitor μF |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **MRS20-TUL** | **MRS20-TM** | Three-Phase 220<br>Three-Phase 230 | 60<br>60 | 0.4<br>0.4 | 95<br>95 | 3400<br>3400 | 15.5<br>15.5 | 547<br>547 | 265<br>265 | 1.06<br>1.06 | 61<br>61 | – |
| **MRS20-BUL** | **MRS20-BM** | Single-Phase 110<br>Single-Phase 115 | 60<br>60 | 1.0<br>1.0 | 95<br>95 | 3400<br>3400 | 15.5<br>15.5 | 547<br>547 | 255<br>265 | 1.02<br>1.06 | 61<br>61 | 6.0 |
| **MRS20-DUL** | **MRS20-DM** | Single-Phase 230 | 60 | 0.5 | 95 | 3400 | 15.5 | 547 | 265 | 1.06 | 61 | 6.0 |

① Voltage: Power supply voltage needed to operate the fans.
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: Median of the maximum air flow that the fan can produce at rated speed ✻1
⑦ Max. Static Pressure: Median of the 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: Median of the 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 fans (Capacitor is included or built-in with products.)
⑩ Alarm Specifications: Indicate the type of fan with alarm
Types of fan alarms include: low-speed alarm (electronic alarm type, contact alarm type), stall alarm (electronic alarm type).
There are 6 alarm and sensor specifications. (These are described by the numbers in ( ) in the specifications tables.)
These numbers correspond to the numbers in the "Low-speed alarm, stall alarm specifications" (Pages G-14 and G-15). Refer to these pages for details.

## 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 $m^3$/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 $inH_2O$) (at 50 Hz) is the maximum static pressure the fan can produce.



# Low-Speed Alarm, Stall Alarm Specifications

The alarm specifications vary depending on the type of alarm.
Check the alarm specifications according to the product name you use.
Specifications can also be referred to by the alarm specifications number shown on the specifications for each product.

## Low-Speed Alarm, Electronic Alarm Type

An alarm is output when the cooling fan speed drops to a specific level. Output mode is electronic output.

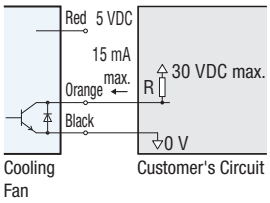
Alarm Specifications Number: ①

●Product Name ◇**MRS** Series: **MRS14**

●Alarm Specifications

| | |
|---|---|
| Alarm Activation Speed | 1800±300 r/min |
| Output Mode | Open-collector output |
| Output Condition | Normal Operation: L Level (Internal transistor ON)<br>Alarm Output: H Level (Internal transistor OFF) |
| Maximum Rating | Maximum Applied Voltage: 30 VDC or less<br>Maximum Inflow Current: 15 mA or less |
| Power Supply for Driving Alarm Circuit | 5 VDC±5% |
| Delay Function | Built-In and Starting Delay Time: 25 sec. or less<br>(The alarm function starts monitoring within 25 seconds after the power is turned on.) |

●Example of Alarm Output Circuit Connection



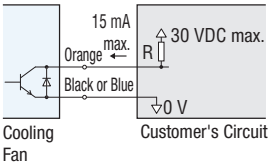

Alarm Specifications Number: ②

●Product Name ◇**MRS** Series: **MRS16-□TM**, **MRS18-□MH**, **MRS18-□TM**, **MRS20-□M**, **MRS25-□M**

●Alarm Specifications

| | |
|---|---|
| Alarm Activation Speed | 1800±300 r/min |
| Output Mode | Open-collector output |
| Output Condition | Normal Operation: L Level (Internal transistor ON)<br>Alarm Output: H Level (Internal transistor OFF) |
| Maximum Rating | Maximum Applied Voltage: 30 VDC or less<br>Maximum Inflow Current: 15 mA or less |
| Delay Function | None (External delay circuit is required to prevent alarm detection when starting the fan. The delay time should be 10 second or more.) |

●Example of Alarm Output Circuit Connection




## Low-speed Alarm, Contact Alarm Type

An alarm is output when the cooling fan speed drops to a specific level. Output mode is contact output.

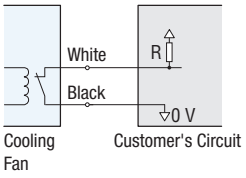
Alarm Specifications Number: ③

●Product Name ◇**MRS** Series: **MRS16-□TA**

●Alarm Specifications

| | |
|---|---|
| Alarm Activation Speed | 1800±300 r/min |
| Output Mode | Relay Output |
| Output Condition | Normal Operation: Contact OFF<br>Alarm Output: Contact ON |
| Maximum Rating | Contact Capacity Resistive Load 10 VA maximum (100 V maximum/0.5 A maximum) |
| Delay Function | None (External delay circuit is required to prevent alarm detection when starting the fan. The delay time should be 10 second or more.) |

●Example of Alarm Output Circuit Connection



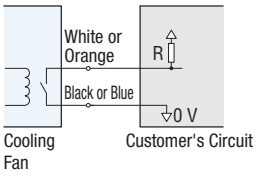

Alarm Specifications Number: ④

●Product Name ◇**MRS** Series: **MRS25-□B**

●Alarm Specifications

| | |
|---|---|
| Alarm Activation Speed | 1800±300 r/min |
| Output Mode | Relay Output |
| Output Condition | Normal Operation: Contact ON<br>Alarm Output: Contact OFF |
| Maximum Rating | Contact Capacity Resistive Load 10 VA maximum (100 V maximum/0.5 A maximum)<br>Minimum load 5 VDC 1mA (Design your circuit to operate at 0.5 mA or less) |
| Delay Function | None (External delay circuit is required to prevent alarm detection when starting the fan. The delay time should be 10 second or more.) |

●Example of Alarm Output Circuit Connection



## Stall Alarm, Electronic Alarm Type

An alarm signal is output when the cooling fan stops while operating.

Sensor Specifications Number

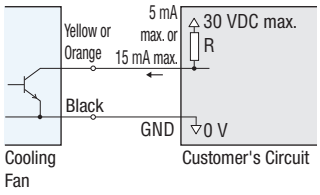
⑤

●Product Name ◇**MDS/MD** Series: **MDS410-□L(H)**, **MDS510-□L(H)**, **MD625B-□L(H)**, **MD825B-□L(H)**, **MD925A-□L(H)**, **MDS1451-□L(H)**

●Sensor Specifications

| | |
|---|---|
| When the Sensor is Activated | When Locked |
| Output Mode | Open-collector output |
| Output Condition | Operation: L Level (Internal transistor ON)<br>When Locked: H Level (Internal transistor OFF) |
| Maximum Rating | Maximum Applied Voltage: 30 VDC or less<br>(15 mA or less for **MD625B-L□**, **MD825B-L□**, **MD925A-□L**) |
| Delay Function | None (External delay circuit is required to prevent sensor detection when starting the fan. The delay time should be 1 second or more.) |

●Example of Alarm Output Circuit Connection




Sensor Specifications Number

⑥

●Product Name ◇**MDS** Series: **MDS1238-24L**

●Sensor Specifications

| | |
|---|---|
| When the Sensor is Activated | When Locked |
| Output Mode | Open-collector output |
| Output Condition | Operation: L Level (Internal transistor ON)<br>When Locked: H Level (Internal transistor OFF) |
| Maximum Rating | Maximum Applied Voltage: 27.6 VDC or less<br>Maximum Inflow Current: 5 mA or less |
| Delay Function | None (External delay circuit is required to prevent sensor detection when starting the fan. The delay time should be 1 second or more.) |

●Example of Alarm Output Circuit Connection