Cooling Fans

Cooling Module

FM Series IP55/43
The **FM** Series offers modular products combining a fan with peripherals. These modules help reduce equipment problems caused by ingress of dust or water, while saving installation and replacement costs.

### Features

- **Preventing Ingress of Dust and Water Droplets**
  The integrated structure consisting of a fan, filter and cover makes it easy to prevent ingress of dust and water droplets into the enclosure.

- **Improvement of Equipment Reliability**
  The entrance of dust or water droplets in the air brought in by cooling fans may cause problems. The **FM** Series will protect your equipment from these factors, resulting in a long life and high reliability.

- **Equipment Heat Measures and Problems**
  - Ingress of dust and water droplets
  - Equipment malfunction
  - Significant impact on production line

- **Effects**
  - Longer equipment life
  - Improved reliability
  - Lower maintenance costs

- **Easy Installation and Maintenance**
  The module can be easily installed only tightening screws from outside filter media. The filter can be replaced from outside the equipment, and maintenance is also easy.

- **RoHS-Compliant**
  The **FM** Series conforms to the RoHS Directive that prohibits the use of six chemical substances including lead and cadmium.
  - Details of RoHS Directive → Page G-38
Effective Cooling Using the FM Series

“Fan and filter panel” and “filter panel” are available for the FM Series. By combining these panels as shown below, ingress of dust and water droplets into the enclosure can be prevented to achieve effective cooling.

1 Suction type "fan and filter panel" at the bottom, "filter panel" at the top

- Air is suctioned using the fans at the bottom, and exhausted from the vent holes at the top.
- The pressure inside the enclosure is raised, so that dust does not easily enter the enclosure through gaps other than the suction intake (such as through gaps at case joints and around cable holes).

2 Suction type "fan and filter panel" at the bottom, exhaust type "fan and filter panel" at the top

- Air is suctioned using the fans at the bottom, and exhausted from the fans at the top.
- This method is ideal for applications where components are densely mounted in the enclosure and the method in 1 does not provide effective cooling.

The methods in 1 and 2 are recommended in general, but the following method is also possible.

- "Filter panel" at the bottom, exhaust type "fan and filter panel" at the top

- The pressure inside the enclosure is lowered, so that air does not easily leak out through gaps other than the exhaust outlets (such as through gaps at case joints and around cable holes). This method is suitable for applications where expelling of dust from inside the enclosure may affect the surrounding environment.

RoHS

- **Fan and Filter Panel**
  - A fan is equipped with a filter and cover. The suction type and exhaust type are available.

- **Filter Panel**
  - A filter is integrated with a cover. Fan is not included.

RoHS

- **Thermostats AM1-WA1/AM1-XA1**
  - A thermostat is ideal for temperature control in the enclosure. More effective cooling is possible by combining the FM Series with a thermostat.
### Types and Features

Both IP55 and IP43 models are available.

- **IP55/IP43**
  - These models conform to the IP55 and IP43 under the IEC Standards.
  - These models are ideal for applications where ingress of dust, foreign objects, water droplets, etc. must be prevented to ensure a high degree of protection.

**Fan and Filter Panel**
- Hood size: Large [209 mm x 226 mm (8.23 in. x 8.90 in.)], Medium [157 mm x 170 mm (6.18 in. x 6.69 in.)], Small [129 mm x 134 mm (5.08 in. x 5.28 in.)]
- Installed fan: □119mm – 38 mm (□4.69 in. – 1.50 in.) Thick AC Axial Flow Fan (Hood size: Large, Medium)
  - □92 mm – 25 mm (□3.62 in. – 0.98 in.) Thick AC Axial Flow Fan (Hood size: Small)
- Air flow direction: Suction type, Exhaust type

**Accessories**
- Plug cord for connection to power supply [1 m (3.3 ft.)], Mounting screws

**Filter Panels Are Available in Same Size**

### Selecting from the FM Series

- **Select Based on Degree of Protection (IP)**
  - Select an appropriate model according to the degree of protection required by your equipment as a whole or the environment in which the equipment is used.

<table>
<thead>
<tr>
<th>Type (Degree of protection)</th>
<th>Explanation of Degree of Protection</th>
<th>Dust-Removal Ratio</th>
<th>External View</th>
<th>Air-Blowing Capacity</th>
<th>Page</th>
</tr>
</thead>
<tbody>
<tr>
<td>IP55</td>
<td>The equipment is protected against ingress of dust and water jet (from all directions).&lt;sup&gt;a&lt;/sup&gt;</td>
<td>95% (Air velocity 0.7 m/s)</td>
<td>Good</td>
<td>E-34</td>
<td></td>
</tr>
<tr>
<td>IP43</td>
<td>The equipment is protected against ingress of wires (with a diameter of 1 mm or more) and sprayed water (coming from directions within a range of 60° relative to the vertical plane).&lt;sup&gt;b&lt;/sup&gt;</td>
<td>48% (Air velocity 2.0 m/s)</td>
<td>Better</td>
<td>E-38</td>
<td></td>
</tr>
</tbody>
</table>

<sup>a</sup> In accordance with the test conditions specified in EN 60529.

<sup>b</sup> On products offering higher degrees of protection, the air flow – static pressure characteristics are lower due to the thickness and density of the filter media used. → Page E-29

---

**In accordance with the test conditions specified in EN 60529.**

**On products offering higher degrees of protection, the air flow – static pressure characteristics are lower due to the thickness and density of the filter media used. → Page E-29**
Degree of Protection

IP codes indicating the grade of dust-resistance and waterproofing are specified as follows under EN 60529.

[Example]

<table>
<thead>
<tr>
<th>IP Code</th>
<th>First Number</th>
<th>Second Number</th>
<th>Protection Level</th>
<th>Test Condition</th>
</tr>
</thead>
<tbody>
<tr>
<td>IP4X</td>
<td></td>
<td></td>
<td>Protected against ingress of wires etc.</td>
<td>Solid objects with a diameter of 1.0 mm or more do not enter.</td>
</tr>
<tr>
<td>IP5X</td>
<td></td>
<td></td>
<td>Protected against powdery dust</td>
<td>Powdery dust that may inhibit normal operation does not enter.</td>
</tr>
</tbody>
</table>

Select Based on Air Flow – Static Pressure Characteristics

The FM Series consists of models that offer varying air flow – static pressure characteristics according to the applicable degree of protection, cooling capacity, space efficiency and other conditions that suit your equipment.

Select a model that best suits the degree of protection, cooling capacity, space efficiency and other conditions that suits your equipment.

The following examples are based on representative characteristics. For the characteristics of each product, refer to pages E-34 to E-42.

Example of Air Flow – Static Pressure Characteristics of IP55

- IP55 models achieve the highest degree of protection among all FM Series fans. Accordingly, their air flow and static pressure are lower compared to IP43 models.
- Use of multiple fans is recommended if your application must conform to IP55 while demonstrating a certain level of air-blowing capacity at the same time.
- The characteristics vary depending on the hood size (large, medium or small) and installed fan □119 mm – 38 mm □4.69 in. – 1.50 in.) thick or □92 mm – 25 mm □3.62 in. – 0.98 in.) thick.

Example of Air Flow – Static Pressure Characteristics of IP43

- IP43 models provide a higher air flow and static pressure compared to IP55.
- The characteristics vary depending on the hood size (large, medium or small) and installed fan □119 mm – 38 mm □4.69 in. – 1.50 in.) thick or □92 mm – 25 mm □3.62 in. – 0.98 in.) thick.
Internal Structure of the FM Series

The figure below illustrates the internal structure of the fan and filter panel. The fan, filter, cover and all other parts come pre-assembled.

IP55/IP43

Exhaust Type

Suction Type

Filter Media
The filter media shuts out dust, water droplets and other objects in the air to maintain clean air inside the enclosure. It is recommended that the filter media be checked periodically for clogging and replaced as necessary. Clogged filter media will cause the cooling capacity to drop.

Fan
The size of the fan is □119 mm — 38 mm (□4.69 in. — 1.50 in.) thick or □92 mm (□3.62 in. — 0.98 in.) thick.

The exhaust type and the suction type are available according to the required air flow direction.

Hood
The hood prevents ingress of water droplets from above. If the module is installed near a wall, the hood ensures that a air flow path is available at all times.

Mounting Frame
This frame is used to affix the product to the enclosure.

Finger Guard
The finger guard protects fingers and other objects from coming in contact with the blades during operation.

Grille
The grille holds the filter, and is fixed to the mounting frame.


**Standards and CE Marking of Installed Fan**

<table>
<thead>
<tr>
<th>Installed Fan</th>
<th>Applicable Standards</th>
<th>Certification Body</th>
<th>Standards File No.</th>
<th>Marking</th>
</tr>
</thead>
<tbody>
<tr>
<td>□119 mm — 38 mm thick</td>
<td>UL, 507</td>
<td>UL</td>
<td>E58377</td>
<td></td>
</tr>
<tr>
<td>(□4.69 in. — 1.50 in. thick)</td>
<td>CSA C22.2 No.113</td>
<td>CSA</td>
<td>LR62524</td>
<td></td>
</tr>
<tr>
<td>□92 mm — 25 mm thick</td>
<td>EN 60950-1</td>
<td>VDE</td>
<td>5870</td>
<td></td>
</tr>
<tr>
<td>(□3.62 in. — 0.98 in. thick)</td>
<td>S Mark</td>
<td>JET</td>
<td>0018-91002-001</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Electrical Appliance and Material Safety Law (Japan)</td>
<td></td>
<td>0018-91002-002</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>0018-91002-003</td>
<td></td>
</tr>
</tbody>
</table>

**General Specifications**

<table>
<thead>
<tr>
<th>Item</th>
<th>Specifications</th>
</tr>
</thead>
<tbody>
<tr>
<td>Insulation Resistance</td>
<td>100 MΩ or more when 500 VDC megger is applied between the windings and the frame after continuous operation under normal ambient temperature and humidity.</td>
</tr>
<tr>
<td>Dielectric Strength</td>
<td>Sufficient to withstand 1.5 kVAC at 50 Hz applied between the windings and the frame for 1 minute after continuous operation under normal ambient temperature and humidity.</td>
</tr>
<tr>
<td>Temperature Rise</td>
<td>30˚C (86˚F) or less measured by the thermometer method after the temperature of the case has stabilized under normal operation at the rated voltage and frequency.</td>
</tr>
<tr>
<td>Operating Voltage Range</td>
<td>±10% of input voltage</td>
</tr>
<tr>
<td>Insulation Class</td>
<td>UL, CSA: Class A [105˚C (221˚F)], Class E [120˚C (248˚F)]</td>
</tr>
<tr>
<td>Overheat Protection</td>
<td>Impedance Protected</td>
</tr>
<tr>
<td>Ambient Temperature</td>
<td>−10℃ (+14) to +60℃ (+140°F)</td>
</tr>
<tr>
<td>Ambient Humidity</td>
<td>85% or less (non-condensing)</td>
</tr>
</tbody>
</table>

**Dust-Removal Ratio of Filter Media**

<table>
<thead>
<tr>
<th>Type</th>
<th>Dust-Removal Ratio</th>
<th>Air Velocity</th>
<th>V [m/s]</th>
</tr>
</thead>
<tbody>
<tr>
<td>IP55 Filter Media</td>
<td>95</td>
<td>0.7</td>
<td></td>
</tr>
<tr>
<td>IP43 Filter Media</td>
<td>48</td>
<td>2.0</td>
<td></td>
</tr>
</tbody>
</table>

**How to Measure Dust-Removal Ratio**

Various methods to measure dust-removal ratio are specified by Japanese Industrial Standard. The table below summarizes the standards specifying measurement of dust-removal ratio as well as measuring equipment used.

<table>
<thead>
<tr>
<th>Related Standards</th>
<th>Supplement</th>
</tr>
</thead>
<tbody>
<tr>
<td>JIS B 9908 Ventilation Air Filter</td>
<td>Type 3 For measurement of coarse dust particles</td>
</tr>
<tr>
<td>Measurement Method: Type 3 Weighing Method</td>
<td>Other methods include type 1 for measuring very fine dust particles and type 2 for measuring fine dust particles.</td>
</tr>
<tr>
<td>Mass method</td>
<td>Measure the mass of trapped dust with respect to the mass of supplied dust and calculate the trapping efficiency based on the mass ratio.</td>
</tr>
<tr>
<td>η = (1 − Wp/Wf) × 100%</td>
<td>η : Dust-removal ratio [%]</td>
</tr>
<tr>
<td>Wf : Mass of supplied dust [g]</td>
<td>Wp : Mass of dust collected in filter [g]</td>
</tr>
<tr>
<td>Other methods include the counting method for measuring very fine dust particles and the colorimetry method for measuring fine dust particles.</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>JIS Z 8901 Test Dust</th>
<th>Type 15 represents mixed powder produced by mixing type 8 powder, type 12 powder and cotton linter at specified ratios.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Test Powder: Type 15</td>
<td>Type 8 (Loamy earth of the Kanto district) Type 12 (Carbon black) Cotton linter</td>
</tr>
<tr>
<td>Percentage</td>
<td>72 [%]</td>
</tr>
<tr>
<td>Composition</td>
<td>6.8 − 8.6 [μm]</td>
</tr>
<tr>
<td>Type 15</td>
<td>0.03 − 0.20 [μm]</td>
</tr>
<tr>
<td></td>
<td>1.5 [μm] length 1 [mm] (0.04 [in.]) max.</td>
</tr>
</tbody>
</table>
## Product Number Code

### Fan and Filter Panel

<table>
<thead>
<tr>
<th>Code</th>
<th>Description</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>FM A 2 3 B I - 2 H 2 2 1</td>
<td>Fan and Filter Panel</td>
<td>FM, FM Series</td>
</tr>
<tr>
<td>① Series</td>
<td></td>
<td>FM</td>
</tr>
<tr>
<td>② Cooling Method</td>
<td></td>
<td>A: Fan and Filter Panel Exhaust Type, B: Fan and Filter Panel Suction Type</td>
</tr>
<tr>
<td>③ Module Type</td>
<td></td>
<td>2: Hood Type</td>
</tr>
<tr>
<td>④ Panel Painted Color</td>
<td></td>
<td>3: Light Gray</td>
</tr>
<tr>
<td>⑤ Media Type</td>
<td></td>
<td>B: For IP43, C: For IP55</td>
</tr>
<tr>
<td>⑥ Additional Functions</td>
<td></td>
<td>I: IP55/IP43</td>
</tr>
</tbody>
</table>

### Filter Panel

<table>
<thead>
<tr>
<th>Code</th>
<th>Description</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>FM Z 2 3 BI - D</td>
<td>Filter Panel</td>
<td>FM, FM Series</td>
</tr>
<tr>
<td>① Series</td>
<td></td>
<td>FM</td>
</tr>
<tr>
<td>② Cooling Method</td>
<td></td>
<td>Z: Filter Panel</td>
</tr>
<tr>
<td>③ Module Type</td>
<td></td>
<td>2: Hood Type</td>
</tr>
<tr>
<td>④ Panel Painted Color</td>
<td></td>
<td>3: Light Gray</td>
</tr>
<tr>
<td>⑤ Media Type</td>
<td></td>
<td>BI: For IP43, CI: For IP55</td>
</tr>
</tbody>
</table>

## Reference Number

- **Module Dimensions (W×H×D [mm (in.)])**
  - H: 209×226×136 (8.23×8.90×5.35)
  - J: 157×170×98 (6.18×6.69×3.86)
  - K: 129×134×80 (5.08×5.28×3.15)

- **Fan Speed**
  - 1: Standard Speed
  - 2: Middle Speed

- **Power Supply Voltage**
  - 2: Single-Phase 115 VAC
  - 5: Single-Phase 220/230 VAC

- **Number of Installed Fans**
  - 1: 1 fan
## Lineup

### Fan and Filter Panel

<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>IP55</td>
<td>129×134 (5.08×5.28)</td>
<td>157×170</td>
<td>Suction</td>
<td>95% (Air velocity 0.7 m/s)</td>
<td></td>
<td>Light gray</td>
<td>□</td>
<td>119 mm – 38 mm thick</td>
<td>Single-Phase 115</td>
<td>E-34</td>
</tr>
<tr>
<td></td>
<td></td>
<td>209×226</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>□</td>
<td>119 mm – 38 mm thick</td>
<td>Single-Phase 115</td>
<td></td>
</tr>
<tr>
<td></td>
<td>(8.23×8.90)</td>
<td>(6.18×6.69)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>□</td>
<td>119 mm – 38 mm thick</td>
<td>Single-Phase 115</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>(8.23×8.90)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>□</td>
<td>119 mm – 38 mm thick</td>
<td>Single-Phase 115</td>
<td></td>
</tr>
<tr>
<td>IP43</td>
<td>129×134 (5.08×5.28)</td>
<td>157×170</td>
<td>Suction</td>
<td>48% (Air velocity 2.0 m/s)</td>
<td></td>
<td>Light gray</td>
<td>□</td>
<td>92 mm – 25 mm thick</td>
<td>Single-Phase 220/230</td>
<td>E-38</td>
</tr>
<tr>
<td></td>
<td></td>
<td>209×226</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>□</td>
<td>92 mm – 25 mm thick</td>
<td>Single-Phase 220/230</td>
<td></td>
</tr>
<tr>
<td></td>
<td>(8.23×8.90)</td>
<td>(6.18×6.69)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>□</td>
<td>92 mm – 25 mm thick</td>
<td>Single-Phase 220/230</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>(8.23×8.90)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>□</td>
<td>92 mm – 25 mm thick</td>
<td>Single-Phase 220/230</td>
<td></td>
</tr>
</tbody>
</table>

### Filter Panel

<table>
<thead>
<tr>
<th>Type</th>
<th>Module Dimensions</th>
<th>W×H [mm (in.)]</th>
<th>Shape (Material)</th>
<th>Dust-Removal Ratio</th>
<th>Color</th>
<th>Page</th>
</tr>
</thead>
<tbody>
<tr>
<td>IP55</td>
<td>129×134 (5.08×5.28)</td>
<td>157×170</td>
<td>Suction</td>
<td>95% (Air velocity 0.7 m/s)</td>
<td>Light gray</td>
<td>E-43</td>
</tr>
<tr>
<td></td>
<td></td>
<td>209×226</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>(8.23×8.90)</td>
<td>(6.18×6.69)</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>(8.23×8.90)</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>IP43</td>
<td>129×134 (5.08×5.28)</td>
<td>157×170</td>
<td>Suction</td>
<td>48% (Air velocity 2.0 m/s)</td>
<td>Light gray</td>
<td>E-43</td>
</tr>
<tr>
<td></td>
<td></td>
<td>209×226</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>(8.23×8.90)</td>
<td>(6.18×6.69)</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>(8.23×8.90)</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

*The same filter medias supplied with products are available as accessories.*  
Filter medias for IP55/IP43 → Page E-43
Fan, Filter Panel

Cooling Fans

Exhaust Type

Suction Type

Fan and Filter Panel

Specifications (RoHS)

<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>FMA23CI-2H221</td>
<td>①</td>
<td>209 mm × 226 mm (8.23 in. × 8.90 in.)</td>
<td>Single-Phase 115</td>
<td>50</td>
<td>15.2</td>
<td>0.19</td>
<td>2300</td>
<td>0.55</td>
<td>19.4</td>
<td>53</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Installed Fan: □119 mm – 38 mm Thick □4.69 in. – 1.50 in. thick</td>
<td></td>
<td>60</td>
<td>14.0</td>
<td>0.18</td>
<td>2500</td>
<td>0.61</td>
<td>21.5</td>
<td>56</td>
</tr>
<tr>
<td>FMA23CI-2H251</td>
<td></td>
<td>92 mm – 25 mm Thick (□3.62 in. – 0.98 in. thick)</td>
<td>Single-Phase 220</td>
<td>50</td>
<td>14.0</td>
<td>0.11</td>
<td>2300</td>
<td>0.55</td>
<td>19.4</td>
<td>51</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Installed Fan: □119 mm – 38 mm Thick □4.69 in. – 1.50 in. thick</td>
<td>Single-Phase 230</td>
<td>50</td>
<td>16.7</td>
<td>0.11</td>
<td>2400</td>
<td>0.55</td>
<td>19.4</td>
<td>53</td>
</tr>
<tr>
<td></td>
<td></td>
<td>□92 mm – 25 mm Thick (□3.62 in. – 0.98 in. thick)</td>
<td>Single-Phase 230</td>
<td>60</td>
<td>14.0</td>
<td>0.11</td>
<td>2500</td>
<td>0.61</td>
<td>21.5</td>
<td>56</td>
</tr>
<tr>
<td>FMA23CI-2J221</td>
<td>②</td>
<td>157 mm × 170 mm (6.18 in. × 6.69 in.)</td>
<td>Single-Phase 115</td>
<td>50</td>
<td>15.2</td>
<td>0.19</td>
<td>2300</td>
<td>0.37</td>
<td>13.1</td>
<td>60</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Installed Fan: □119 mm – 38 mm Thick □4.69 in. – 1.50 in. thick</td>
<td>Single-Phase 220</td>
<td>50</td>
<td>14.0</td>
<td>0.11</td>
<td>2300</td>
<td>0.37</td>
<td>13.1</td>
<td>59</td>
</tr>
<tr>
<td>FMA23CI-2J251</td>
<td></td>
<td>□92 mm – 25 mm Thick (□3.62 in. – 0.98 in. thick)</td>
<td>Single-Phase 230</td>
<td>50</td>
<td>16.7</td>
<td>0.11</td>
<td>2400</td>
<td>0.37</td>
<td>13.1</td>
<td>60</td>
</tr>
<tr>
<td></td>
<td></td>
<td>□92 mm – 25 mm Thick (□3.62 in. – 0.98 in. thick)</td>
<td>Single-Phase 230</td>
<td>60</td>
<td>14.0</td>
<td>0.11</td>
<td>2500</td>
<td>0.41</td>
<td>14.5</td>
<td>63</td>
</tr>
<tr>
<td>FMA23CI-2K121</td>
<td>③</td>
<td>129 mm × 134 mm (5.08 in. × 5.28 in.)</td>
<td>Single-Phase 115</td>
<td>50</td>
<td>11.2</td>
<td>0.13</td>
<td>2600</td>
<td>0.16</td>
<td>5.65</td>
<td>41</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Installed Fan: □92 mm – 25 mm Thick (□3.62 in. – 0.98 in. thick)</td>
<td>Single-Phase 220</td>
<td>50</td>
<td>9.4</td>
<td>0.12</td>
<td>3000</td>
<td>0.20</td>
<td>7.06</td>
<td>55</td>
</tr>
<tr>
<td>FMA23CI-2K151</td>
<td></td>
<td>□92 mm – 25 mm Thick (□3.62 in. – 0.98 in. thick)</td>
<td>Single-Phase 230</td>
<td>50</td>
<td>10.2</td>
<td>0.07</td>
<td>2600</td>
<td>0.16</td>
<td>5.65</td>
<td>41</td>
</tr>
<tr>
<td></td>
<td></td>
<td>□92 mm – 25 mm Thick (□3.62 in. – 0.98 in. thick)</td>
<td>Single-Phase 230</td>
<td>60</td>
<td>9.4</td>
<td>0.07</td>
<td>3000</td>
<td>0.20</td>
<td>7.06</td>
<td>55</td>
</tr>
</tbody>
</table>

How to read specifications ➜ Page E-19
Details of RoHS Directive ➜ Page G-38
The maximum air flow, maximum static pressure and noise level are representative values.
Assemble the filter media to the hood. If you assemble it to the grill, the air flow may decrease.
Internal structure of the FM Series ➜ Page E-30
The following items are included in each product.
- Cooling Module, Plug Cord, Mounting Screws, Operating Manual

Air Flow – Static Pressure Characteristics

How to read air flow – static pressure characteristics ➜ Page E-20

50 Hz

60 Hz
Cooling Fans

Introduction

FM
AC Input
MRS
AC Input
Variable Flow
MRS
AC Input
MU
DC Input
MDE
DC Input
MDS/MD
AC Input
MB
DC Input
MBD
AC Input
MF
DC Input
MFD
Thermostats

Accessories
Installation

FM
AC Input
MRS
AC Input
Variable Flow
MRS
AC Input
MU
DC Input
MDE
DC Input
MDS/MD
AC Input
MB
DC Input
MBD
AC Input
MF
DC Input
MFD
Thermostats

Accessories
Installation

Plug Cord for Connection to Power Supply (Included)

Plug Cord for Connection to Power Supply (Included)

Plug Cord for Connection to Power Supply (Included)

Plug Cord for Connection to Power Supply (Included)

Plug Cord for Connection to Power Supply (Included)

Plug Cord for Connection to Power Supply (Included)

Plug Cord for Connection to Power Supply (Included)

Plug Cord for Connection to Power Supply (Included)

Plug Cord for Connection to Power Supply (Included)

Plug Cord for Connection to Power Supply (Included)

Plug Cord for Connection to Power Supply (Included)

Plug Cord for Connection to Power Supply (Included)

Plug Cord for Connection to Power Supply (Included)

Plug Cord for Connection to Power Supply (Included)

Plug Cord for Connection to Power Supply (Included)

Plug Cord for Connection to Power Supply (Included)

Plug Cord for Connection to Power Supply (Included)

Plug Cord for Connection to Power Supply (Included)

Plug Cord for Connection to Power Supply (Included)

Plug Cord for Connection to Power Supply (Included)

Plug Cord for Connection to Power Supply (Included)

Plug Cord for Connection to Power Supply (Included)

Plug Cord for Connection to Power Supply (Included)

Plug Cord for Connection to Power Supply (Included)

Plug Cord for Connection to Power Supply (Included)

Plug Cord for Connection to Power Supply (Included)

Plug Cord for Connection to Power Supply (Included)

Plug Cord for Connection to Power Supply (Included)

Plug Cord for Connection to Power Supply (Included)

Plug Cord for Connection to Power Supply (Included)

Plug Cord for Connection to Power Supply (Included)

Plug Cord for Connection to Power Supply (Included)

Plug Cord for Connection to Power Supply (Included)

Plug Cord for Connection to Power Supply (Included)

Plug Cord for Connection to Power Supply (Included)

Plug Cord for Connection to Power Supply (Included)

Plug Cord for Connection to Power Supply (Included)

Plug Cord for Connection to Power Supply (Included)

Plug Cord for Connection to Power Supply (Included)

Plug Cord for Connection to Power Supply (Included)

Plug Cord for Connection to Power Supply (Included)

Plug Cord for Connection to Power Supply (Included)

Plug Cord for Connection to Power Supply (Included)

Plug Cord for Connection to Power Supply (Included)

Plug Cord for Connection to Power Supply (Included)

Plug Cord for Connection to Power Supply (Included)

Plug Cord for Connection to Power Supply (Included)

Plug Cord for Connection to Power Supply (Included)

Plug Cord for Connection to Power Supply (Included)

Plug Cord for Connection to Power Supply (Included)

Plug Cord for Connection to Power Supply (Included)

Plug Cord for Connection to Power Supply (Included)

Plug Cord for Connection to Power Supply (Included)

Plug Cord for Connection to Power Supply (Included)

Plug Cord for Connection to Power Supply (Included)

Plug Cord for Connection to Power Supply (Included)

Plug Cord for Connection to Power Supply (Included)

Plug Cord for Connection to Power Supply (Included)

Plug Cord for Connection to Power Supply (Included)

Plug Cord for Connection to Power Supply (Included)

Plug Cord for Connection to Power Supply (Included)

Plug Cord for Connection to Power Supply (Included)

Plug Cord for Connection to Power Supply (Included)

Plug Cord for Connection to Power Supply (Included)

Plug Cord for Connection to Power Supply (Included)

Plug Cord for Connection to Power Supply (Included)

Plug Cord for Connection to Power Supply (Included)

Plug Cord for Connection to Power Supply (Included)

Plug Cord for Connection to Power Supply (Included)

Plug Cord for Connection to Power Supply (Included)

Plug Cord for Connection to Power Supply (Included)

Plug Cord for Connection to Power Supply (Included)

Plug Cord for Connection to Power Supply (Included)

Plug Cord for Connection to Power Supply (Included)

Plug Cord for Connection to Power Supply (Included)

Plug Cord for Connection to Power Supply (Included)

Plug Cord for Connection to Power Supply (Included)

Plug Cord for Connection to Power Supply (Included)

Plug Cord for Connection to Power Supply (Included)

Plug Cord for Connection to Power Supply (Included)

Plug Cord for Connection to Power Supply (Included)

Plug Cord for Connection to Power Supply (Included)

Plug Cord for Connection to Power Supply (Included)

Plug Cord for Connection to Power Supply (Included)

Plug Cord for Connection to Power Supply (Included)

Plug Cord for Connection to Power Supply (Included)

Plug Cord for Connection to Power Supply (Included)

Plug Cord for Connection to Power Supply (Included)

Plug Cord for Connection to Power Supply (Included)

Plug Cord for Connection to Power Supply (Included)

Plug Cord for Connection to Power Supply (Included)

Plug Cord for Connection to Power Supply (Included)

Plug Cord for Connection to Power Supply (Included)

Plug Cord for Connection to Power Supply (Included)

Plug Cord for Connection to Power Supply (Included)

Plug Cord for Connection to Power Supply (Included)

Plug Cord for Connection to Power Supply (Included)

Plug Cord for Connection to Power Supply (Included)

Plug Cord for Connection to Power Supply (Included)

Plug Cord for Connection to Power Supply (Included)

Plug Cord for Connection to Power Supply (Included)

Plug Cord for Connection to Power Supply (Included)
**FM Series IP55**

- **119 mm – 38 mm Thick (4.69 in. – 1.50 in. Thick) Fan Installed**
- **92 mm – 25 mm Thick (3.62 in. – 0.98 in. Thick) Fan Installed**

**Suction Type**

**Fan and Filter Panel**

### Specifications (RoHS)

<table>
<thead>
<tr>
<th>Model</th>
<th>Diagram Number</th>
<th>Size</th>
<th>Input Voltage</th>
<th>Frequency</th>
<th>Input Current</th>
<th>Speed</th>
<th>Max. Air Flow</th>
<th>Max. Static Pressure</th>
<th>Noise Level</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>FMB23CI-2H221</strong></td>
<td>①</td>
<td>209 mm × 226 mm (8.23 in. × 8.90 in.)</td>
<td>Single-Phase 115</td>
<td>50 Hz</td>
<td>15.2</td>
<td>0.19</td>
<td>2300</td>
<td>0.47</td>
<td>16.6</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>60 Hz</td>
<td>14.0</td>
<td>0.18</td>
<td>2500</td>
<td>0.52</td>
<td>18.4</td>
</tr>
<tr>
<td><strong>FMB23CI-2H225</strong></td>
<td>②</td>
<td>119 mm – 38 mm Thick (4.69 in. – 1.50 in. thick)</td>
<td>Single-Phase 220</td>
<td>50 Hz</td>
<td>14.0</td>
<td>0.11</td>
<td>2300</td>
<td>0.44</td>
<td>15.5</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>60 Hz</td>
<td>16.7</td>
<td>0.11</td>
<td>2400</td>
<td>0.47</td>
<td>16.6</td>
</tr>
<tr>
<td><strong>FMB23CI-2J221</strong></td>
<td>②</td>
<td>157 mm × 170 mm (6.18 in. × 6.69 in.)</td>
<td>Single-Phase 115</td>
<td>50 Hz</td>
<td>15.2</td>
<td>0.19</td>
<td>2300</td>
<td>0.32</td>
<td>11.3</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>60 Hz</td>
<td>14.0</td>
<td>0.18</td>
<td>2500</td>
<td>0.34</td>
<td>12.0</td>
</tr>
<tr>
<td><strong>FMB23CI-2J251</strong></td>
<td>③</td>
<td>119 mm – 38 mm Thick (4.69 in. – 1.50 in. thick)</td>
<td>Single-Phase 220</td>
<td>50 Hz</td>
<td>16.7</td>
<td>0.11</td>
<td>2400</td>
<td>0.32</td>
<td>11.3</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>60 Hz</td>
<td>14.0</td>
<td>0.11</td>
<td>2500</td>
<td>0.34</td>
<td>12.0</td>
</tr>
<tr>
<td><strong>FMB23CI-2K121</strong></td>
<td>③</td>
<td>129 mm × 134 mm (5.08 in. × 5.28 in.)</td>
<td>Single-Phase 115</td>
<td>50 Hz</td>
<td>11.2</td>
<td>0.13</td>
<td>2600</td>
<td>0.14</td>
<td>4.84</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>60 Hz</td>
<td>9.4</td>
<td>0.12</td>
<td>3000</td>
<td>0.17</td>
<td>6.00</td>
</tr>
<tr>
<td><strong>FMB23CI-2K151</strong></td>
<td>③</td>
<td>92 mm – 25 mm Thick (3.62 in. – 0.98 in. thick)</td>
<td>Single-Phase 220</td>
<td>50 Hz</td>
<td>10.2</td>
<td>0.10</td>
<td>2600</td>
<td>0.14</td>
<td>4.84</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>60 Hz</td>
<td>9.4</td>
<td>0.07</td>
<td>3000</td>
<td>0.17</td>
<td>6.00</td>
</tr>
</tbody>
</table>

- How to read specifications → Page E-19
- Details of RoHS Directive → Page G-38
- The maximum air flow, maximum static pressure and noise level are representative values.
- Assemble the filter media to the hood. If you assemble it to the grill, the air flow may decrease.
- Internal structure of the FM Series → Page E-30

- The following items are included in each product:
  - Cooling Module, Plug Cord, Mounting Screws, Operating Manual

### Air Flow – Static Pressure Characteristics

- How to read air flow – static pressure characteristics → Page E-20

**50 Hz**

**60 Hz**

#### How to read specifications

- **Ambient Temperature:** -10°C ~ +60°C (+14°F ~ +140°F)
- **Operating Voltage Range:** ±10%
- **Dust-Removal Ratio of Filter Media:** 95%
- **Materials:**
  - **Enclosure:** Hood: Polycarbonate (Flammability grade: V-0)
  - **Grille:** ABS (Flammability grade: V-0)
  - **Mounting Frame:** ABS (Flammability grade: V-0)
- **Installed Fan**
  - **Fan Frame:** Die Cast Aluminum
  - **Blades:** Polycarbonate (Flammability grade: V-0)
- **Overheat Protection:** Impedance Protected
- **Bearings:** Ball Bearings

#### How to read air flow – static pressure characteristics

- **Air Flow – Static Pressure Characteristics**
- **How to read air flow – static pressure characteristics** → Page E-20
Cooling Fans

Introduction

FM
AC Input
MRS
AC Input
Variable Flow
MRS
AC Input
MU
DC Input
MDE
DC Input
MDS/MD
AC Input
MB
DC Input
MBD
AC Input
MF
DC Input
MFD
Thermostats

Accessories
Installation

Dimensions  Unit = mm (in.)

1 FMB23CI-2H2 1
Mass: 1.1 kg (2.4 lb.)
Refer to page E-42 for the panel cut-out and connection diagram, and page E-43 for the filter panel.

2 FMB23CI-2J2 1
Mass: 0.9 kg (2.0 lb.)

3 FMB23CI-2K1 1
Mass: 0.5 kg (1.1 lb.)

Plug Cord for Connection to Power Supply (Included)

2-Core Flat Vinyl Cord (Black)
SPT-1 AWG18

Refer to page E-42 for the panel cut-out and connection diagram, and page E-43 for the filter panel.
Fan, Filter Panel

Cooling Fans
Exhaust Type
Suction Type

Filter Panel

E-38 ORIENTAL MOTOR GENERAL CATALOG 2009/2010

Features E-26 / General Specifications E-31

FM Series IP43

☐ 119 mm – 38 mm Thick
(☐ 4.69 in. – 1.50 in. Thick) Fan Installed

☐ 92 mm – 25 mm Thick
(☐ 3.62 in. – 0.98 in. Thick) Fan Installed

Exhaust Type
Fan and Filter Panel

Specifications (RoHS)

<table>
<thead>
<tr>
<th>Model</th>
<th>Diagram Number</th>
<th>Size</th>
<th>Input Voltage</th>
<th>Frequency</th>
<th>Input Voltage</th>
<th>Input Current</th>
<th>Speed r/min</th>
<th>Max. Air Flow m³/min</th>
<th>Max. Static Pressure Pa</th>
<th>Noise Level dB (A)</th>
</tr>
</thead>
<tbody>
<tr>
<td>FMA23BI-2H21</td>
<td>①</td>
<td>209 mm × 226 mm</td>
<td>Single-Phase 115</td>
<td>50</td>
<td>15.2</td>
<td>0.19</td>
<td>2300</td>
<td>1.21</td>
<td>42.7</td>
<td>51</td>
</tr>
<tr>
<td></td>
<td></td>
<td>(8.23 in. × 8.90 in.)</td>
<td></td>
<td>60</td>
<td>14.0</td>
<td>0.18</td>
<td>2500</td>
<td>1.37</td>
<td>48.4</td>
<td>56</td>
</tr>
<tr>
<td>FMA23BI-2H251</td>
<td>②</td>
<td>157 mm × 170 mm</td>
<td>Single-Phase 220</td>
<td>50</td>
<td>14.0</td>
<td>0.11</td>
<td>2300</td>
<td>1.18</td>
<td>41.7</td>
<td>49</td>
</tr>
<tr>
<td></td>
<td></td>
<td>(6.18 in. × 6.69 in.)</td>
<td></td>
<td>60</td>
<td>14.0</td>
<td>0.11</td>
<td>2500</td>
<td>1.37</td>
<td>48.4</td>
<td>56</td>
</tr>
<tr>
<td>FMA23BI-2J221</td>
<td>③</td>
<td>129 mm × 134 mm</td>
<td>Single-Phase 220</td>
<td>50</td>
<td>14.0</td>
<td>0.11</td>
<td>2300</td>
<td>0.76</td>
<td>26.8</td>
<td>58</td>
</tr>
<tr>
<td></td>
<td></td>
<td>(5.08 in. × 5.28 in.)</td>
<td></td>
<td>60</td>
<td>14.0</td>
<td>0.11</td>
<td>2500</td>
<td>0.83</td>
<td>29.3</td>
<td>61</td>
</tr>
<tr>
<td>FMA23BI-2J251</td>
<td></td>
<td>92 mm × 92 mm</td>
<td>Single-Phase 230</td>
<td>50</td>
<td>14.0</td>
<td>0.11</td>
<td>2400</td>
<td>0.76</td>
<td>26.8</td>
<td>58</td>
</tr>
<tr>
<td></td>
<td></td>
<td>(3.62 in. × 3.62 in.)</td>
<td></td>
<td>60</td>
<td>14.0</td>
<td>0.11</td>
<td>2600</td>
<td>0.83</td>
<td>29.3</td>
<td>61</td>
</tr>
</tbody>
</table>

How to read specifications ➔ Page E-19
Details of RoHS Directive ➔ Page G-38
The maximum air flow, maximum static pressure and noise level are representative values.
Assemble the filter media to the hood. If you assemble it to the grill, the air flow may decrease.
Internal structure of the FM Series ➔ Page E-30

The following items are included in each product:
Cooling Module, Plug Cord [1 m (3.3 ft.)],
Mounting Screws, Operating Manual

Air Flow – Static Pressure Characteristics

How to read air flow – static pressure characteristics ➔ Page E-20

50 Hz

60 Hz
**Dimensions**  Unit = mm (in.)

1. **FMA23BI-2H2**
   - Mass: 1.1 kg (2.4 lb.)
   - Dimensions:
     - Exhaust Type Air Flow

2. **FMA23BI-2J2**
   - Mass: 0.9 kg (2.0 lb.)
   - Dimensions:
     - Exhaust Type Air Flow

3. **FMA23BI-2K1**
   - Mass: 0.5 kg (1.1 lb.)
   - Dimensions:
     - Exhaust Type Air Flow

**Plug Cord for Connection to Power Supply (Included)**

- 2-Core Flat Vinyl Cord (Black)
  - SPT-1 AWG18

Refer to page E-42 for the panel cut-out and connection diagram, and page E-43 for the filter panel.
**FM Series IP43**

**119 mm – 38 mm Thick**
(4.69 in. – 1.50 in. Thick) Fan Installed

**92 mm – 25 mm Thick**
(3.62 in. – 0.98 in. Thick) Fan Installed

**Suction Type**

**Fan and Filter Panel**

---

**Specifications (RoHS)**

<table>
<thead>
<tr>
<th>Model</th>
<th>Diagram Number</th>
<th>Size</th>
<th>Input Voltage</th>
<th>Frequency</th>
<th>Input W</th>
<th>Current A</th>
<th>Speed r/min</th>
<th>Max. Air Flow m³/min</th>
<th>Max. Static Pressure Pa</th>
<th>Noise Level dB (A)</th>
</tr>
</thead>
<tbody>
<tr>
<td>FMB23BI-2H221</td>
<td>☐ 1</td>
<td>209 mm x 226 mm (8.23 in. x 8.90 in.)</td>
<td>Single-Phase 115</td>
<td>50</td>
<td>15.2</td>
<td>0.19</td>
<td>2300</td>
<td>1.08</td>
<td>38.1</td>
<td>41</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>60</td>
<td>14.0</td>
<td>0.18</td>
<td>2500</td>
<td>1.25</td>
<td>44.1</td>
<td>46</td>
</tr>
</tbody>
</table>

| FMB23BI-2H251 | ☐ 1         | 157 mm x 170 mm (6.18 in. x 6.69 in.) | Single-Phase 115 | 50        | 15.2   | 0.19      | 2300        | 0.71                  | 25.1                   | 43                |
|           |               |                                    |               | 60        | 14.0   | 0.18      | 2500        | 0.80                  | 28.2                   | 45                |

| FMB23BI-2J221 | ☐ 2         | 129 mm x 134 mm (5.08 in. x 5.28 in.) | Single-Phase 115 | 50        | 11.2   | 0.13      | 2600        | 0.40                  | 14.1                   | 33                |
|           |               |                                    |               | 60        | 9.4    | 0.12      | 3000        | 0.49                  | 17.3                   | 44                |

| FMB23BI-2J251 | ☐ 2         | 119 mm x 119 mm (4.69 in. x 4.69 in.) | Single-Phase 115 | 50        | 16.7   | 0.11      | 2400        | 0.71                  | 25.1                   | 43                |

**How to read specifications** → Page E-19

**Details of RoHS Directive** → Page G-38

**Ambient Temperature:** −10°C to +60°C (+14°C to +140°F)
**Operating Voltage Range:** ±10%
**Dust-Removal Ratio of Filter Media:** 48%
**Materials**
  - **Enclosure**
    - Hood: Polycarbonate (Flammability grade: V-0)
    - Grille: ABS (Flammability grade: V-0)
  - **Mounting Frame**: ABS (Flammability grade: V-0)
  - **Installed Fan**
    - Fan Frame: Die Cast Aluminum
    - Blades: Polycarbonate (Flammability grade V-0)
  - **Overheat Protection**: Impedance Protected
  - **Bearings**: Ball Bearings

---

**Air Flow – Static Pressure Characteristics**

**How to read air flow – static pressure characteristics** → Page E-20

**50 Hz**

**60 Hz**
### Dimensions  Unit = mm (in.)

<table>
<thead>
<tr>
<th>Model</th>
<th>Mass</th>
<th>E101</th>
</tr>
</thead>
<tbody>
<tr>
<td>FMB23BI-2H2</td>
<td>1.1 kg (2.4 lb.)</td>
<td></td>
</tr>
<tr>
<td>FMB23BI-2J2</td>
<td>0.9 kg (2.0 lb.)</td>
<td></td>
</tr>
<tr>
<td>FMB23BI-2K1</td>
<td>0.5 kg (1.1 lb.)</td>
<td></td>
</tr>
</tbody>
</table>

#### Plug Cord for Connection to Power Supply (Included)

<table>
<thead>
<tr>
<th>Dimensions</th>
<th>Unit</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>8</td>
<td>in.</td>
<td>0.315</td>
</tr>
<tr>
<td>15.5</td>
<td>in.</td>
<td>0.61</td>
</tr>
<tr>
<td>7.5</td>
<td>in.</td>
<td>0.30</td>
</tr>
<tr>
<td>17</td>
<td>in.</td>
<td>0.67</td>
</tr>
<tr>
<td>24 (0.94)</td>
<td>in.</td>
<td>0.67</td>
</tr>
<tr>
<td>1000 (39.37)</td>
<td>in.</td>
<td>0.39</td>
</tr>
</tbody>
</table>

2-Core Flat Vinyl Cord (Black) SPT-1 AWG18

● Refer to page E-42 for the panel cut-out and connection diagram, and page E-43 for the filter panel.
**Panel Cut-Out**  Unit = mm (in.) These panel cut-outs apply to both fan and filter panel, and filter panel.

- **Dimensions** 209 mm × 226 mm (8.23 in. × 8.90 in.)
- **Fan and Filter Panel**
  - IP55: FMA23CI-2H2 [1] (Exhaust type)
  - IP55: FMB23CI-2H2 [1] (Suction type)
  - IP43: FMA23BI-2H2 [1] (Exhaust type)
  - IP43: FMB23BI-2H2 [1] (Suction type)
- **Filter Panel**
  - IP55: FMZ23CI-D
  - IP43: FMZ23BI-D

- **Dimensions** 157 mm × 170 mm (6.18 in. × 6.69 in.)
- **Fan and Filter Panel**
  - IP55: FMA23CI-2J2 [1] (Exhaust type)
  - IP55: FMB23CI-2J2 [1] (Suction type)
  - IP43: FMA23BI-2J2 [1] (Exhaust type)
  - IP43: FMB23BI-2J2 [1] (Suction type)
- **Filter Panel**
  - IP55: FMZ23CI-E
  - IP43: FMZ23BI-E

- **Dimensions** 129 mm × 134 mm (5.08 in. × 5.28 in.)
- **Fan and Filter Panel**
  - IP55: FMA23CI-2K1 [1] (Exhaust type)
  - IP55: FMB23CI-2K1 [1] (Suction type)
  - IP43: FMA23BI-2K1 [1] (Exhaust type)
  - IP43: FMB23BI-2K1 [1] (Suction type)
- **Filter Panel**
  - IP55: FMZ23CI-F
  - IP43: FMZ23BI-F

**Connection Diagram** The connection diagram applies to all IP55/IP43 models of FM Series.
Ingress of dust or water droplets into the enclosure and discharge dust from the enclosure can be prevented by installing a filter panel over the vent holes in the enclosure.

### Product Line

**IP55**

<table>
<thead>
<tr>
<th>Model</th>
<th>Size [mm (in.)]</th>
</tr>
</thead>
<tbody>
<tr>
<td>FMZ23CI-D</td>
<td>209×226 (8.23×8.90)</td>
</tr>
<tr>
<td>FMZ23CI-E</td>
<td>157×170 (6.18×6.69)</td>
</tr>
<tr>
<td>FMZ23CI-F</td>
<td>129×134 (5.08×5.28)</td>
</tr>
</tbody>
</table>

**IP43**

<table>
<thead>
<tr>
<th>Model</th>
<th>Size [mm (in.)]</th>
</tr>
</thead>
<tbody>
<tr>
<td>FMZ23BI-D</td>
<td>209×226 (8.23×8.90)</td>
</tr>
<tr>
<td>FMZ23BI-E</td>
<td>157×170 (6.18×6.69)</td>
</tr>
<tr>
<td>FMZ23BI-F</td>
<td>129×134 (5.08×5.28)</td>
</tr>
</tbody>
</table>

### Dimensions

**FMZ23CI-D**
Mass: 0.5 kg (1.1 lb.)

**FMZ23CI-E**
Mass: 0.3 kg (0.66 lb.)

**FMZ23CI-F**
Mass: 0.2 kg (0.44 lb.)

The following items are included in each product:
- Filter Panel
- Mounting Screws
- Operating Manual

- Dimensions of panel cut-out are also same as those of fan and filter panels.

### Accessories

**Replacement Filter Media**

- [Filter Media for IP55](#)
- [Filter Media for IP43](#)

### Thermostats

A thermostat makes it possible for fans to operate only when cooling is necessary, thereby conserving energy.

**Thermostats**

- [AM1-WA1/AM1-XA1](#)