

# Fan Sizing Calculations

## Selecting a Fan

This section describes basic methods of selecting typical ventilation and cooling products based on their use.

### Device specifications and conditions

Determine the devices required internal temperature.

### Heat generation within the device

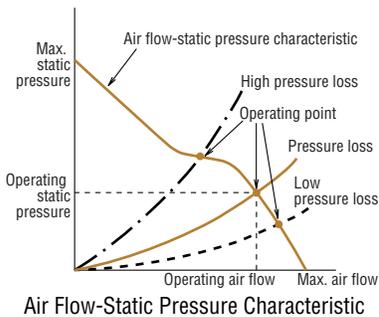
Determine the amount of heat generated internally by the device.

### Calculate required air flow

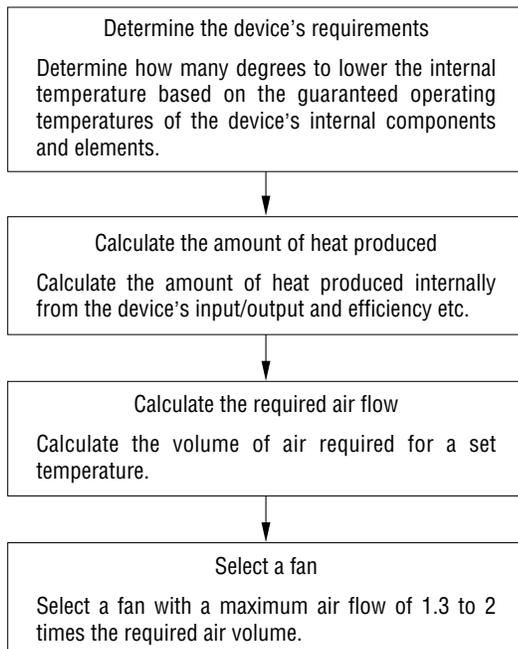
Once you have determined the amount of heat generated, the number of degrees the temperature must be lowered and what the ambient temperature should be, calculate the air flow required.

### Selecting a fan

Select a fan using the required air flow. The air flow of a mounted fan can be found from the fan's air flow vs. static pressure characteristics and the pressure loss of the object to be cooled. It is difficult to calculate the device's pressure loss, so an estimation for the maximum air flow of 1.3 to 2 times the required air flow may be used.



## Fan Selection Flowchart



## Fan Selection Details

### Cabinet Specifications

Item	Letter	Specifications
Installation Conditions	—	Factory Floor
Cabinet	Size	W Width 0.48 m (19 in.) H Height 1.44 m (57 in.) D Depth 0.36 m (14 in.)
	Surface area	S 2.42 m <sup>2</sup> * (3758 in. <sup>2</sup> )
	Material	— Steel
	Overall Heat Transfer Coefficient	U 5 W / (m <sup>2</sup> /K)
Target Temperature Rise	ΔT	50°F (10°C) Ambient Temperature T <sub>1</sub> 25°C (77°F) Max. temperature inside of cabinet T <sub>2</sub> 35°C (95°F)
Total Heat Generation	Q	1200 W
Safety Factor	Sf	2
Power Source	—	60 Hz 115 VAC

\* Surface of Cabinet = Side Area + Top Area  
 $= 1.8 \times H \times (W+D) + 1.4 \times W \times D$   
 $= 2.42 \text{ m}^2 \text{ (3758 in.}^2\text{)}$

### 1 Required Air Flow

◆ Determine Required Air Flow Using Calculations

K: Coefficient 0.05

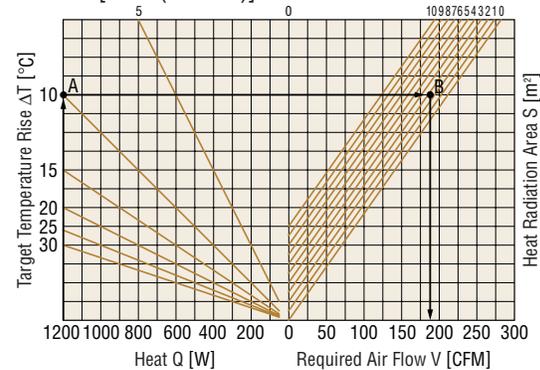
$$V = K \times (Q \div \Delta T - U \times S) \times Sf$$

$$= 0.05 \times (1200 \div 10 - 5 \times 2.42) \times 2$$

$$= 10.8 \text{ [m}^3\text{/min] (381 [CFM])}$$

◆ Determine Required Air Flow Using a Graph

- Search for the cross point A between output of heat Q (1200 W) and target temperature rise ΔT [50°F (10°C)].
- Draw a line parallel with the x axis from point A.
- Search for the cross point B between the parallel line and surface area S [2.42 m<sup>2</sup> (3758 in.<sup>2</sup>)] line.
- Draw a line to the x axis from point B, required airflow is approx. 190 CFM [5.4 (m<sup>3</sup>/min)].
- Use a safety factor of Sf = 2, Required airflow will be 380 CFM [10.8 (m<sup>3</sup>/min)].



### 2 Applicable Fans

Based on the air flow requirement, the **MRS18-BTM** is the best match.

#### MRS18-BTM Specifications

Voltage VAC	Frequency Hz	Input W	Current A	Speed r/min	Max. Air Flow		Max. Static Pressure		Noise dB (A)
					CFM	m <sup>3</sup> /min	inH <sub>2</sub> O	Pa	
115	60	95	1.0	3350	452	12.8	0.98	245	61