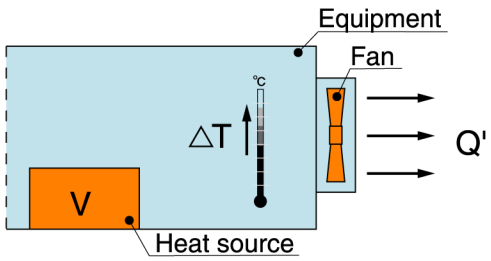
The following example is a guideline on to how to select an appropriate fan motor for cooling heat-producing equipment by forced air-cooling.

Determine the Conditions of the Device to be Cooled

Determine the permissable temperature rise (ΔT), and the total heat generated inside the equipment (V).

- Example
  V : Total generated heat = 100 Watt
  ΔT : Permissable temperature rise = 15K*

  *ΔT = 15K, for instance, signifies that the average airflow leaving the device may be only 15 C warmer than the ambient temperature.



Calculate the Required Air Flow

Calculate the air flow required to satisfy the above conditions by using the formula** below.

**This formula assumes that heat is dissipated by cooling air coming from the fan motor only.

- Example (using V = 100 Watt, ΔT = 15K)
  Q' : Operating air flow (m^3/min.)

$$Q' = \frac{V}{20\Delta T} = \frac{100\ W}{20 \times 15K} \fallingdotseq 0.33\ m^3/min\ (11.65\ CFM)$$

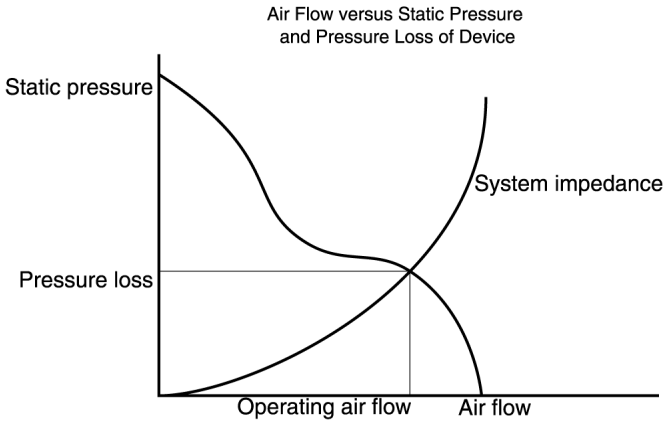
Selecting the Fan Motor

The actual air flow when the fan motor is mounted onto the device can be determined from the air flow-static pressure characteristics curve of the fan motor and the pressure loss of the electronic device. However, since the pressure loss of the device cannot be determined without using a measuring instrument, a fan with a maximum airflow apacity of 1.5 to 2 times the operating air flow should be selected as a effective starting point for fan performance trials.

- Example (using Q' = 0.33 m^3/min)
  Q : Maximum air flow (m^3/min.)
  Q' = Q×2/3
  Q = Q'×3/2 = 0.33×3/2 ≒ 0.5 m^3/min (17.66 CFM)

From the above calculations, fan motors having a maximum air flow of 0.5 m^3/min or more should be selected as possible candidates for performance trials . A final choice should be made after taking into account the space requirements, noise level, economy and ambient conditions of the application.

In this example, a fan of 60mm square, 25mm thickness and 12V, which meets the required maximum air flow calculated above is DC San Ace 109R0612H402 (maximum air flow = 0.53m^3/min.).



Verifying the Selected Fan Motor

Calculate the temperature rise inside the device when 100 Watt of total generated heat is forcefully cooled by a 109R0612H402 fan motor.

- Example (using the above values)
  Q' = Q×2/3 = 0.53×2/3 ≒ 0.353 m^3/min
  ΔT = V/20Q' = 100(W)/20×0.353 m^3/min ≒14.2K