Selecting the correct fan

1. Dissipated energy

A large amount of the energy consumed by electrical and electronic devices is converted to heat. So when selecting the correct fan, it is important to determine the dissipated energy that must be removed. The electrical power consumption of the unit to be cooled often represents a suitable value for this purpose.

2. Admissible temperature increase

The air flow that the selected fan is required to generate, is determined by the dissipated energy and the admissible heating (ΔT) of the cooling airflow (from entry to exit of the device to be cooled). The maximum admissible ΔT depends greatly on the temperature sensitivity of the individual parts of the device.

For example, $\Delta T = 5K$ means that the average cooling airflow leaving the device to be cooled may be only 5°C warmer than the ambient temperature. This requires a lot of air. A lower air flow rate is sufficient if a higher temperature difference (e.g. $\Delta T = 20K$), can be tolerated.

3. Required cooling airflow

- In the diagram below, a horizontal line is drawn from the dissipated energy to intersect with the selected ΔT line.
- Read down from this point to obtain the required value for the cooling airflow. The diagram is based on the following formula:

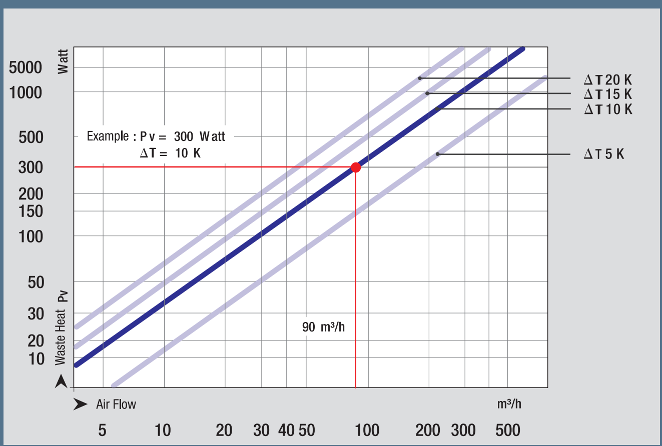
$$q_V = \frac{P_V}{C_{PL} \cdot \rho_L \cdot \Delta T}$$

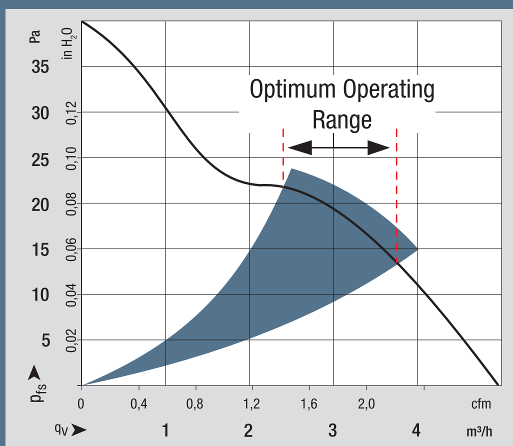
4. Optimum operating range

But the fan you are looking for must also be able to deliver a suitable static pressure increase Δpf, in order to force the cooling air through the device. So a fan must be selected that provides the required air flow performance within its optimum operating range (see also the air performance curves under technical data).

5. Fan selection

If more than one fan meets your requirements, the sound level, space requirements, economy, and ambient conditions will assist in making the final choice.





Definitions

P_V = amount of heat to be dissipated in [W]
C_{PL} = specific heat capacity of air in [J/kg/K]
C_{PL} = 1010 [J/kg/K]

ρL = air density in [kg/m^3]
ρL = 1,2 kg/m^3
$\Delta T = T_1 - T_2$ temperature difference in [K] between inlet and outlet