

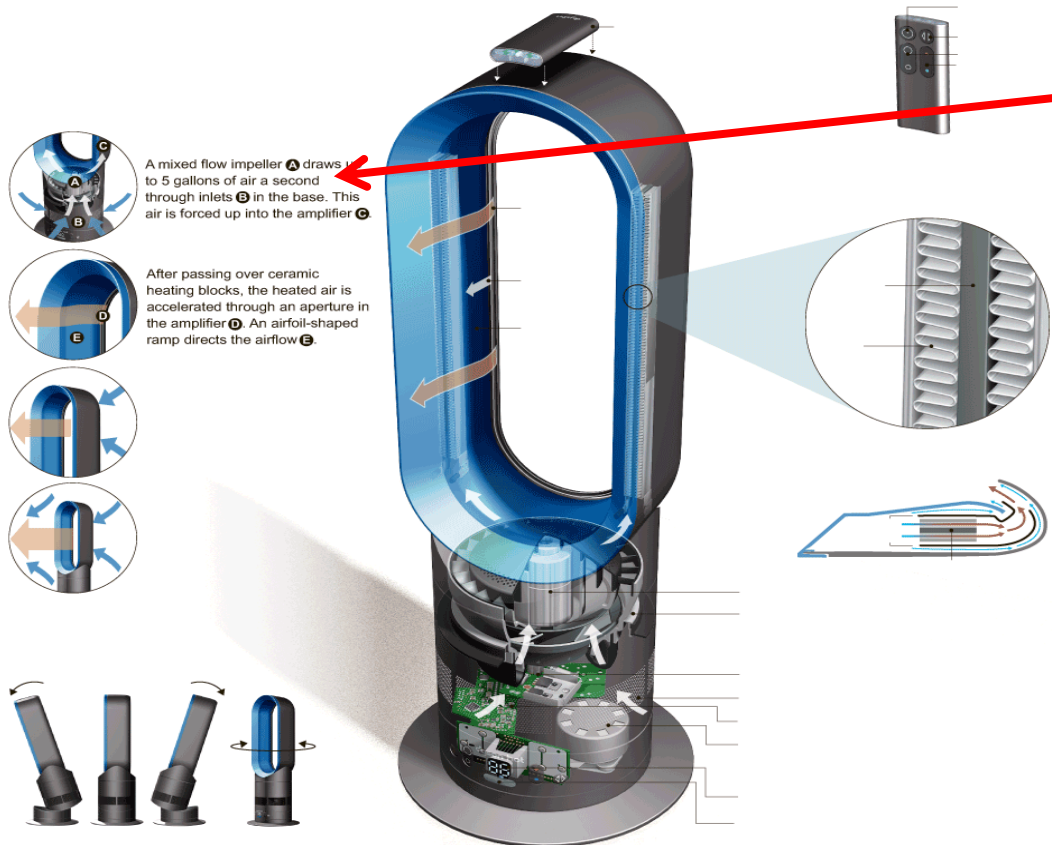
HEAT & HEATING OF AIR

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A New Way to Get More Comfort Out of Hot Air

The Dyson Hot space heater answers an age-old question. “How can I get greater efficiency and a higher circulation of air from a radiant heat source?” What the engineers at Dyson — the outfit that re-thought the way vacuum cleaners and hand dryers work — have done with this device is to make use of a new way to heat air and move it around a room. The Dyson Hot creates a column of warm air that can be sent in various directions thanks to its tilting and oscillating base. The end result, Dyson says, is a heater that has no external moving parts like spinning blades and can run almost half as hot as conventional models while still providing the same or better output. Such technology does not come cheaply — the Dyson Hot costs \$400. Here is how all of that innovation works. SAM GROBART



INTRODUCTION: This new 2012 heater is able to heat **5 gallons of air per second.**

Some useful numbers:

- 3.785 liters/gallon
- 1000 cc(cm³)/liter
- 1 m³ = 10⁶ cc
- Density of air = 1.225 kg/m³
- Specific heat capacity of air = 1 KJ/kg °C = c

Density = mass/volume

Useful concepts:
Heat(Q) = c m (delta)T

(1)
Q/t = heat/time = c m(delta)T/t

QUESTIONS: (a) Convert 5 gallons to m³ ? (b) Knowing volume of air in m³ passing through the heater per secondfind mass of this air? Note: The density of air is given above to the right. (c) Using equation(1) above find the power(Q/t) in watts(J/s) needed to heat 5 gallons of air/second from 21 C° to 41 C° ?

ANSWERS: (a) 1.8925 X 10⁻² m³ (b) 2.318 X 10⁻² kg. (c)~ 463.6 watts or 463.6 J/s