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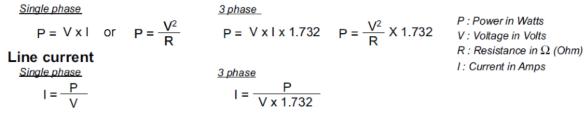
Plug It In Using Heater Selection Formulas

At times when designing or selecting a heater, the schedule/specifications may not include all the details you need. This article will help calculate the missing details/information to complete the selection process.

The basic information required when selecting a heater is: (a) **VOLTAGE**/ph/Hz; (b) Power in **kW**; (c) **DUCT DIMENSIONS**; (d) **AIRFLOW**. If one of these details is missing, the process of selecting and ordering a heater is incomplete.

(a) Neptronic heaters are custom built as per your selection. If you do not know the voltage – do not assume. Please find out the correct voltage before submitting a selection. If the current in amps (*I*) is provided, the kW can be calculated using the formula below. Note that the voltages are with +/- 5% tolerance. Using wrong voltages could damage the heater.

Electric power



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Neptronic Pte Ltd Office D6, #03-38, Mountbatten Square 229, Mountbatten Road, Singapore – 398 007 Mobile: +65 8118 4184 Tel: +65 6650 6212 Fax: +65 6491 6423 (b) Often you may not see the power (*kW*) listed on the schedule. Airflow and temperature rise (Delta T) are required to calculate the kW. Information could be provided in Imperial or Metric format. Pay attention to plug in your values in the correct formula.

Power or electric heater capacity	
Imperial	Metric
$kW = \frac{CFM \times (T^{\circ}2 - T^{\circ}1) \times 1.08}{3413}$	$P = \frac{Q \times (T^{\circ}2 - T^{\circ}1) \times 1,21}{3600}$
kW : Power in kW	P: Power in kW
CFM : Air volume in Cubic Feet per Minute	Q : Air volume in m³/hour
T°2 : Temperature of air leaving heater in	∞ F T∞2: Temperature of air leaving heater in ∞ C
$T^{\circ}1$: Temperature of air entering heater in	∞ <i>F</i> T ∞ 1: Temperature of air entering heater in ∞ C
Temperature differential $\Delta T = T^{\circ}2$	2 - T°1
<u>Imperial</u>	<u>Metric</u>

Δ Τ -	kW x 3413	Δ Τ –	P x 3600
$\Delta I = -$	CFM x 1.08	$\Delta I = -$	Q x 1,21

(c) **Dimensions** are very important to manufacture a heater. Our heaters are custom built to fit any duct size but cannot be field modified if actual duct dimensions are different. Duct area can be calculated using below formulas, but this will only provide a minimum duct size in square feet or square meters based on your kW.

KW per square foot

Imperial		<u>Metric</u>	
$kW / pi^2 = \frac{kW}{S}$	kW : Power in kW S : Surface area in square feet	$kW / m^2 = \frac{P}{S}$	P : Power in kW S : Surface area in m ²
Duct area $\frac{Imperial}{S = \frac{W \times H}{144}}$	S : Surface area in square feet W : Duct width in inches H : Duct Height in inches	<u>Metric</u> S = W x H	S : Surface area in m² W :Duct width in meter H : Duct height in meter

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(d) **AIRFLOW** plays an important role in the selection. Neptronic's heater software selects the appropriate type of heating element (gauge/quantity) based on the airflow that is entered. The same formula used to calculate kW can be used to estimate airflow.

<u>Imperial</u>		<u>Metric</u>	
kW = CFMx (T°2 - T°1) x 1.03 3413	8	P =	Q x (T°2 - T°1) x 1,21 3600
kW : Power in kW			P : Power in kW
CFM : Air volume in Cubic Fe	et per Minute		Q : Air volume in m³/hour
T°2 : Temperature of air leavi	ng heater in ∞F		T∞2: Temperature of air leaving heater in ∞C
T°1 : Temperature of air enter	ring heater in ∞F		T∞1: Temperature of air entering heater in ∞ C
Temperature differential	$\Delta T = T^{\circ}2 - T^{\circ}1$		
<u>Imperial</u>		<u>Metric</u>	
$\Delta T = \frac{kW \times 3413}{CFM \times 1.08}$		Δ T =	P x 3600 Q x 1,21

Here are some conversions that may help for quick calculations;

Conversions			
∞ F to ∞ C ∞C = $\frac{(∞F - 32)}{1.8}$	∞ C to ∞ F ∞F=(1.8 x ∞C) + 32	BTU to kW 1 kW = 3413 BTU/hre	kW to BTU 1 BTU/hre = 0.29307 x 10 ⁻³ kW
mm to inches 1 in = 25.4 mm	Inches to mm 1 mm = 0.03937 in	CFM to FPM 1 FPM = $\frac{1 \text{ CFM}}{\text{S}}$ S : Surface area in square	FPM to CFM 1 CFM = 1 FPM x S e feet

These formulas are there to help you when selecting electric heaters. Use them to your advantage!

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