

BASIC WIRING DATA

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Calculating Amps & Wattages

E= Volts
I= Amps or Current
R= Ohms or Resistance
P= Watts or Power

Basic Formulas:

If you know Two factors, you can find the Third.

$$I = \frac{E}{R} \quad R = \frac{E}{I} \quad E = R \times I \quad P = E \times I \quad I = \frac{P}{E} \quad E = R \times I$$

How to Calculate Amps

The first step in determining what additional wiring you need is to add up the wattage of all lights and appliances that normally operate together on a single circuit. You'll find appliance wattages listed on a metal or metallic foil "name-plate" displayed somewhere on the appliance—usually right inside a door, or attached on the back. If any of your name-plates are missing or illegible, check the adjacent chart for approximate wattages.

Since *amperage equals watts divided by volts*, divide the total watts consumed on each 120-volt circuit by 120. If the result is more than 1,800 on a circuit with a 15-amp fuse or circuit breaker, or 2,400 for a 20-amp protective device, you may find yourself running to replace fuses or reset circuit breakers quite often. Try plugging one or more of the appliances or devices into another circuit. If this preventive measure doesn't help, it's time to consider additional wiring.

Circuits carrying 240 volts are almost always used for a single appliance, like a stove or air conditioner. Check the appliance's amperage (also listed on the nameplate) against the rating of the fuses or circuit breaker used to protect it.

Typical Wattage Ratings

Item	Watts	Item	Watts
Air Conditioner (room)	1350	Lamp (outdoor)	100
Air conditioning (central)	5000	Lamps	60-150
Blender	250	Lathe	300
Can opener	150	Microwave oven	625
Coffeemaker	600	Mixer	150
Dishwasher	1800	Radio	50
Drill press	300	Range (electric)	8000 to 16000
Dryer	6000	Refrigerator	250
Fan	75	Roaster	1300
Food warmer	500	Rotisserie	1400
Freezer	350	Saw	570
Fryer	1320	Shaver	10
Furnace	250	Stereo	300
Garbage disposer	900	Sump pump	300
Grill	1300	Sun lamp	275
Heater (hot water)	2500	Television	300
Heater (room)	1800	Toaster	1100
Hot plate (2-burner)	1650	Vacuum cleaner	400
Iron (hand)	1000	Ventilator	100
Ironer	1650	Washer	350
Lamp (floor)	300		

To obtain amperes, divide watts by volts. Use 120 for the latter—it is close enough for practical purposes. Line voltage runs generally between 110 and 120.

Wire Sizes for Typical Applications

Note: All wires listed are the smallest size than can safely do the job. Larger wires can be substituted.

Electric Service	Thermostat
100 amp—#1 AWG wire	Heat & air—#18 AWG (5 wire)
200 amp—#3/0 AWG wire	Heat only—#18 AWG (3 wire)
225 amp—#4/0 AWG wire	Service Entrance
400 amp—600 MCM or twin # 3/0 AWG wire	100 amp #4 AWG
600 amp—Twin 350 MCM	125 amp #2 AWG
Kitchen Stove	150 amp #1 AWG
Over 10 feet from load center—#6 AWG (3 wire)	200 amp #2/0 AWG
Under 10 feet from load center—#8 AWG (3 wire)	

Unit Weight	Circuit Size	Recommended Wire		One Ground Wire
		Two Hot Wires		
		60°C	75°C	
2 ton	30 amp	#10 AWG	#10 AWG	#10 AWG
2½ ton	35 amp	#8 AWG	#10 AWG	#10 AWG
3 ton	45 amp	#6 AWG	#8 AWG	#10 AWG
3½ ton	45 amp	#6 AWG	#8 AWG	#10 AWG
4 ton	60 amp	#4 AWG	#6 AWG	#10 AWG
5 ton	80 amp	#3 AWG	#4 AWG	#8 AWG