

# RV Electrical Breakers & Amperage Usage

Credit in part to <https://axleaddict.com/rvs/Appliances-and-your-RV-calculating-Loads>

## How to Calculate the Current Load of Your RV Appliances

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### Electrical Circuits & AC-Voltage Breakers

All RV's, regardless of the type and size, are designed with cabling systems for connecting to external AC power sources. These connections and systems inside the RV support not only the built-in electrical equipment but also the numerous other appliances the owner may want to use while traveling and camping. Your RV is wired so that all of the 110-VAC power (110 volts AC power) used inside the RV goes through the main breaker panel. These breakers are rated at different current limits to protect the equipment inside the RV, and thus prevent overloading of the RV's electrical circuits and wiring. If one or more of your AC-voltage circuit breakers "kicks off," that means the current exceeds what your circuit was designed for.

### When Overload Conditions Occur

When a circuit breaker in the RV kicks off from overload while you are camping, it seems to always be a surprise. Some of an RV's breakers are dedicated to specific pieces of electrical equipment inside the RV, such as the air conditioner, refrigerator, televisions, and other high-current devices. Other breakers are general circuits that provide power to banks of 110-VAC receptacles placed in the RV for the convenience of the camping family. So, when a breaker does activate, the owner needs to consider what may have caused the breaker to kick out. If an air conditioner's breaker kicks out, you know what to do to determine the problem. You will generally check to see if it's your external source power first. But, when you have one of the general circuit breakers kick out, you need to look at the problem a little differently.

### 110-VAC Appliances and Personal Devices Draw Current

RV camping families tend to have quite a few electrical devices that operate directly on 110-VAC or often operate on batteries that require the use of chargers that operate on 110-VAC. Common personal devices that campers plug into their RV's receptacles include cell phone chargers, personal computers, flashlights, TVs, satellite receivers, and portable stereos. All of these will draw some level of current even while not charging a device or operating. Most RVs also use home appliances that draw higher current, including coffee pots, mixers, electric frying pans, electric crock pots, toasters, portable ice makers, and other higher current drawing home appliances, all of which add to your load on your breakers. All of these devices draw some amount of current while operating, and they, like most common appliances, will typically have a label that lists the maximum wattage the appliance will use when it is operated. But many other devices will only list the maximum current the appliance will draw and not the wattage. When one of your breakers kicks out, you need to figure out things like:

1. What 110-VAC equipment you're using at different times of the day.
2. How much current each of your devices draws when operating.
3. How you can manage their use so that everyone can enjoy their camping experience while not disrupting the power available to everyone.

### Appliance Amperage Draw Chart

You should know just how much amperage each appliance draws when it is in operation and the table below is a good quick reference for the most common appliances and how much Amps they can draw. Note that the Amps below are typical. Some appliances may require more or less depending on their efficiency and size.

#### EQUIPMENT

#### AMPERAGE DRAWS

RV Converter (charging)

1-8 Amps

EQUIPMENT	AMPERAGE DRAWS
Lights (per bulb)	0.5 -1.5 Amps
Water Heater (6-gallon, heating)	8-13 Amps
RV Air Conditioner (Start-up)	16-18 Amps
RV Air Conditioner (Running)	13-16 Amps
Window Air Conditioner	5-10 Amps
RV Roof Fan	3-5 Amps
Ceiling Fan (low to high setting)	0.2-6 Amps
Oscillating Fan	0.5-1 Amps
Furnace Fan	7-9 Amps
Space Heater (1600 watts)	7-13 Amps
Space Heater (800 watts)	4-10 Amps
Refrigerator	5-8 Amps
Portable Ice Maker	19.2 Amps
Blender	5-6 Amps
Microwave Oven (Standard)	7-13 Amps
Microwave Oven (Convection)	7-15 Amps
Portable Pizza Oven	12.2 Amps

EQUIPMENT	AMPERAGE DRAWS
Toaster	8-10 Amps
Coffee Maker	5-8 Amps
Electric Kettle	6-12 Amps
Frying Pan (Cooking - High)	7-12 Amps
Crock-Pot (Cooking - High)	3-5 Amps
Crock-Pot (Warming)	1-2 Amps
Food Processor	5-8 Amps
Hair Dryer (High)	7-13 Amps
Curling Iron	0.5-0.7 Amps
Iron (High)	8-10 Amps
Washer/Dryer	140-16 Amps
Vacuum (Hand-Held)	2-6 Amps
DVD, Disc Player, Radio	0.5-2 Amps
Television HD, Digital	1.5-4 Amps
Satellite Receiver/Game Console	0.5-0.8 Amps
Computer (Laptop)	2-3 Amps
Chargers (small electronics)	0.5 to 1.5 Amps

EQUIPMENT	AMPERAGE DRAWS
Drill	2-6 Amps
Golf Cart Charger	13-21 Amps

This is just a basic guide to assist you in how many Amps you're using at any given time. If you need to know exact amperage ratings you can check the data plate on any motors, appliances, or electronic equipment you are using. If you can't locate a data plate with this information, check the appliance or electronic equipment owner's manual. This information might provide wattage requirements rather than Amps. Here is a simple formula to help you convert some common electrical terms.

#### **How to Convert Maximum Watts to Maximum Current**

When a breaker goes off, especially the main breaker, you want to figure out how much total current you are using. A certain level of current is what sets off the breaker. The simple thing to do is look at everything you have plugged into a circuit of receptacles and add up the maximum current that the circuit might be subjected to if everything is plugged in and operated at once. When you see an appliance with a label that only lists the wattage, you may need to figure out the actual maximum current it will draw.

#### **Use This Formula to Calculate Current**

There is a simple formula for converting the maximum wattage rating of an appliance to a maximum current number.

**A = W/V Current (A or amps) equals watts (W) divided by voltage (V), or more simply,**

**A=W/V.** For example, if you have a coffee pot that is rated at 1500 watts, you can easily calculate the maximum amount of current that coffee pot will draw by dividing that wattage number by **110 volts**, which is the voltage available on your standard AC receptacles in your RV. So, if you divide 1500 (watts) by 110 (volts) you end up with the maximum current the coffee pot will draw, or in this case,  $1500/110 = 13.6$  Amps. Now, remember this is the **maximum** current the coffee pot will draw.

In reality, it will draw a lot less when it is just keeping your coffee warm, but when it is perking the coffee, it can be operating near this maximum current limit. And, considering that your RV's circuit breakers are usually 20-Amp breakers, this load from the coffee pot, while it's actively perking, would leave with an additional current capacity just 6.4 amps ( $20 - 13.6$ ) on that circuit of receptacles.

When you understand this way of calculating AC voltage limitations, you will be able to avoid plugging in two high-wattage or high-current appliances on the same circuit and operating them both at the same time.