

## Generator Sizing

### DETERMINING YOUR ENERGY NEEDS

#### BECAUSE WITH A GENERATOR, SIZE MATTERS

The first thing you need to do is determine what size generator would work best for your particular requirements.

*This section will help walk you through that process.*

When purchasing a generator, it's important that you select one that's capable of meeting your energy requirements.

You must match the **rated output** of the generator to the maximum **anticipated power to be used**.

This section will assist you in estimating the power requirements so you can purchase the generator that will satisfy your needs.

This includes using the accompanying worksheet to make a list of the tools and appliances you expect to operate, as well as the approximate power requirements for each device.

Once you have the list, you can estimate the highest demand that will be put on the generator under the "worst-case" conditions. With this figure, you can determine the appropriate model Yamaha generator for your particular needs.

**WARNING: Electrocutation, severe personal injury or death can occur: Do not connect any generator to any building's electrical system unless an isolation switch has been installed by a licensed electrician. Refer to the Generator Owner's Manual.**

**CAUTION: Property damage can occur: Do not connect any generator to any building's electrical system unless an isolation switch has been installed by a licensed electrician. Refer to the Generator Owner's Manual.**

#### TAKE IT STEP-BY-STEP

Follow these steps when determining your energy needs:

1. Identify the wattage requirements for the tools and appliances that you want to power. The power requirement for the tool or appliance can be found on its identification plate or in the Owner's Manual. If the power requirement is given in amps, multiply the amps times volts to derive the required watts.

$$\text{Amps} \times \text{Volts} = \text{Watts}$$

2. Add up the required watts of all the tools and appliances you expect to operate simultaneously.

3. The total watts derived in step 2 is the size Yamaha generator you need. These three simple steps will "size" a generator.

The Additional Guidelines section explains the procedures to calculate and size for motor starting.

**This chart lets you immediately add up all of the appliances you will most likely utilize:**

#### GENERATOR WORKSHEET

	RUNNING WATTAGE REQUIREMENTS	ADDITIONAL STARTING WATTAGE REQUIREMENTS	TOTALS
<b>HEATING/COOLING:</b>			
Furnace Fan, gas or fuel oil furnace			
1/8 horsepower	300	500	
1/6 horsepower	500	750	
1/4 horsepower	600	1000	

2/5 horsepower	700	1400
3/5 horsepower	875	2350
Central Air Conditioner		
10,000 BTU	1500	2200
20,000 BTU	2500	3300
24,000 BTU	3800	4950
32,000 BTU	5000	6500
40,000 BTU	6000	6700
<b>HEATING/COOLING:</b>		<b>SUB-TOTAL:</b>
<b>KITCHEN</b>		
Refrigerator, Average	600	2200
Dish Washer - Cool Dry	700	1400
Dish Washer - Hot Dry	1450	1400
Clothes Dryer - Gas	700	1800
Clothes Dryer - Electric	5750	1800
Microwave Oven, 750W	750	800
Washing Machine	750	2300
Coffee Maker	850	0
Toaster 2-slice	1100	0
Toaster 4-slice	1650	0
Electric Skillet	1500	0
Electric Range 6-in. element	1500	0
Electric Range 8-in. element	2100	0
Freezer	2500	2200
<b>KITCHEN</b>		<b>SUB-TOTAL:</b>
Hair Dryer	800 - 1700	0
Iron	1200	0
<b>BATHROOM</b>		<b>SUB-TOTAL:</b>
Lights- Wattage	<b>Actual:</b>	
VCR	50	0
Heating Pad	65	0
Radio	100	0
Television - Black & White	100	0
Television - Color	300	0
Dehumidifier	400	0
Electric Blanket	400	0
Garage Door Opener - 1/4HP	550	1100
Garage Door Opener - 1/3HP	725	1400
Well Pump - 1/3 hp	750	1400
Well Pump - 1/2 hp	1000	2100
Sump Pump - 1/3 hp	500-1200	1700
Sump Pump - 1/2 hp	1050	2150
Vacuum Cleaner - Standard	800	0
Vacuum Cleaner - Deluxe	1100	0
<b>APPLIANCES</b>		<b>SUB-TOTAL:</b>
1/4" Drill	300	300
Jigsaw	300	300

Electric Weed Trimmer	500	500
Router	1000	1000
Belt Sander	1000	1000
Disc Sander	1200	1200
Chain Saw	1200	1200
Worm Drive Saw	1560	3100
12" Concrete Cutter	1800	3600
7 1/4" Circular Saw	1500	3000
Disc Grinder	2000	4000
Air Compressor, Average	2000	4000
<b>COMMERCIAL PRODUCTS:</b>		<b>SUB-TOTAL:</b>
		<b>GRAND TOTAL</b>

#### ADDITIONAL GUIDELINES

#### CONVERTING AMPS OR HORSEPOWER INTO WATTS

If necessary, use these formulas:

$$\text{Watts} = \text{Amps} \times \text{Volts}$$

$$\text{Running Watts}^* = \text{Horsepower} \times 932^{**} \text{ (for motors)}$$

Remember, this worksheet lists **average power requirements** — a particular manufacturer's device may use more or less than the listed wattage.

Add a 10% correction factor to your totals to help overcome this uncertainty.

If your customer plans to operate devices that use electric motors, list **both** the **starting** and **running requirements** of each.

**Starting requirements** of some devices maybe significantly higher than their **running requirements**. This **higher** demand must be considered when estimating your power needs. Some small, universal motors — which do not draw a heavy starting load (drills, small saws, blenders, etc.) — require very little extra current for starting.

When listing items that use motors, take them in the order of highest-to-lowest starting requirements, as shown in the example below. Motor A, for instance, has a **starting requirement** of 2,600 watts, so it's listed first, followed by Motor B at 1,300 watts, and Motor C at 1,000 watts.

MOTOR/ DEVICE	STARTING WATTS	RUNNING WATTS
Motor A	2,600	850
Motor B	1,300	600
Motor C	1,000	750

Once you have compiled an accurate list of what you will be operating, you can calculate the maximum power requirements. There are three different calculations you can make, depending upon the kinds of tools and appliances on the list, and their intended use:

No electric motors.

One motor running at a time.

More than one motor running at a time.

## NO ELECTRIC MOTORS

If your list *does not* include any devices that use electric motors, simply add the power (**running**) requirements of all the items on your list to obtain the maximum power needed.

For example, if you intend to use only an electric skillet, a 100-watt light and a heating pad (as shown below), the maximum power requirement would be 1,655 watts. In this case, a generator like the EF2800i, that can produce 2,500 watts **rated** output, is recommended.

DEVICE	WATTS	
Electric Skillet	1,500	
Light	100	
Heating Pad	65	
<b>Total:</b>	<b>1,665</b>	

**NOTE:** The EF1600's **rated** output is 1,400 watts, so its output would be too low to handle this load on a continuous basis.

Footnotes:

\*Running Watts is the amount of power a motor consumes once it has started to run at normal speed.

\*\*932 is the factor used to convert motor horsepower ratings to needed electrical energy. It takes into account normal losses in utilizing that power.