

Generators for Emergencies

Portable Generators for Emergency Power



The most economical way to supply power during a power outage is to use a portable generator of the appropriate [wattage](#) for your needs (4000 Watts is a common minimum) and run [extension cords](#) into the house to power chosen appliances. A safer system is to have an electrician install a power transfer switch, connected to the house's main electrical panel. Just fire up the generator, run a single extension cord into the transfer switch and power the circuits you need through the main circuit breaker. This eliminates the risk of electrical “back feed” injuring utility workers repairing downed power lines.

But, you must remember to turn off enough circuits to not overload the generator. Overloads may damage the generator and any electronics or motors including refrigeration units that are energized. You can use the appliance name plate amps & volts to calculate wattage. Remember that startup amperage is much higher than running amperage for all electric motor loads.

A small portable gasoline-powered electric generator can provide power for TVs, small kitchen appliances, hair dryers, power tools, lights and other comforts of civilization when you are out roughing it in the woods.

Portable generators can be put to work on construction sites that have no electrical service, providing clean, reliable power to operate any AC-powered tools. Most are gasoline-powered, a few run on diesel, and some models have multi-fuel capabilities, running on gasoline, propane or natural gas. These are generally full-featured machines with engine idle control, GFCI receptacles and 120 Volt full power switch.

Residential Standby Systems



An emergency home standby generator system can automatically restore power to your house in about 20 seconds. When the power goes out, the generator automatically starts and continues to run until power is restored. You can choose a generator that delivers enough power for the entire house (including air conditioning) or go with a smaller unit and power a few selected circuits, like the refrigerator, sump pump, furnace fan and several lights for basic survival.

These all-weather generators are installed outside the home and are wired through an automatic transfer switch to the main electrical panel. The use of an automatic transfer switch is required when generators are connected to home wiring.

Home standby systems can be fueled by natural gas, LP gas or diesel fuel. Many models can be connected to the home's natural gas line, eliminating the need to fill fuel tanks. Standby system capacities range from 6,000 Watts up to 40,000 Watts and more, and start automatically-even if you are not home.

Commercial Standby Systems



If you have a business that simply can't be without power or you have no existing source of electrical power for your home or business, you will need an industrial generator. These are typically stationary, heavy-duty units that generate single (120 Volt) or three-phase (120, 240 or 480 Volt) power. These massive systems are powered by water-cooled diesel engines, with some models generating up to 200 KW (200,000 Watts) of power. With the use of an automatic transfer switch, these generators can serve as backup power for large commercial or industrial operations, such as nursing homes, refrigeration operations, farms, large buildings and other businesses that can't go without power due to an outage.

PTO and Belt-Drive Generators



Create power on demand by attaching a generator to the PTO on your tractor or construction equipment. Belt-driven generator heads work with your existing gas engines. They are less expensive because the engine is not included. A safer system is to have an electrician install a power transfer switch.



Questions You Should Ask Before You Buy a Generator

- **What is the generator's wattage capacity and will it support your needs, including startup surge power required by some equipment?**
- **Does the generator have enough outlets to plug in all of the items you want to power?**
- **How noisy is the generator? Are there noise restrictions in your neighborhood?**
- **What type of fuel does it use?**
- **How large is the fuel tank and how many hours of operation will it provide?**
- **Is the generator easy to move around? Does it have built-in wheels and handles for portability?**
- **What will I need to run the generator (fuel, heavy-duty extension cords, or transfer switch)?**

How Many Watts Will Your Generator Need to Produce?

Add up the wattage of tools, appliances and motors you want to run at the same time. Then select a generator with the RUNNING wattage rating to match or exceed the total load. Keep in mind that tools and appliances with electric motors require additional tool/appliance SURGE wattage at startup that can be double or triple the normal running wattage requirement. Look at the surge watts required and make sure you choose a generator with enough additional wattage to start them. Keep in mind that you typically are not starting more than half of the items at the same time.

Most home appliances and power tools are 120 Volts; larger appliances like electric stoves and clothes dryers may be 240 Volts. Generator power is measured in Watts: **Amps x Volts = Watts**

You can use the Wattage Chart to estimate the wattages of the tools, appliances and motors you will be operating at the same time. Wattages noted below are approximates only; please refer to tool or appliance name-plate or product literature for specific wattage required.

Safety Tips for Using Generators

- **Plug appliances directly into generator**
- **Do not attempt to connect the generator directly to your home's circuits or wiring. Have an electrician install a transfer switch and plug the generator into this switch. This will keep the generator from feeding power back into the lines, which could put power company crews working on the lines at risk. This will also protect your generator and home wiring from damage when power is restored.**
- **Use heavy-duty extension cords from the generator, as overloaded cords can cause fires and equipment damage. Make sure cords are placed to avoid tripping hazards, but don't put underneath carpets where heat may build up.**
- **Never run a generator indoors and make sure there is proper ventilation around unit.**
- **Never add fuel while generator is running. Avoid spilling fuel on hot components and put out all flames or cigarettes when handling fuel.**
- **Always have a fully charged, approved fire extinguisher near generator.**
- **Don't overload the generator. Use only when necessary to power essential equipment.**
- **Be cautious handling electrical cords in wet conditions.**

Also check out the information provided by Bob Schultheis at [EMW1015](http://extension.missouri.edu/publications/DisplayPub.aspx?P=EMW1015) - <http://extension.missouri.edu/publications/DisplayPub.aspx?P=EMW1015>.

The video has very good information.

<http://extension.missouri.edu/publications/DisplayPub.aspx?P=EMW1016>

[Sizing & Safety Tips for Standby Power Generators](http://extension.missouri.edu/webster/webster/security/standbypower.html)

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Wattage Chart

	Running Wattage Required	Surge Wattage Required at Startup
Household/RV		
Coffee Maker	1750	0
Dishwasher: Cool/Dry	700	1400
Electric Fry Pan	1300	0
Electric Range: 8in. Element	2100	0
625W Microwave	625	800
Refrigerator or Freezer	700	2200
Automatic Washer	1150	2300
Electric Clothes Dryer	1800	5750
Furnace Fan (Gas or fuel oil): 1/8 HP	300	500
Furnace Fan (Gas or fuel oil): 1/6 HP	500	750
Furnace Fan (Gas or fuel oil): 1/4 HP	600	1000
Furnace Fan (Gas or fuel oil): 1/3 HP	700	1400
Furnace Fan (Gas or fuel oil): 1/2 HP	875	2350
Lights	As indicated on bulb	0
Radio	50-200	0
Sump Pump: 1/3 HP	800	1300
Sump Pump: 1/2 HP	1050	2150
Color Television	300	0
RV Air Conditioner: 13,500 BTU	1500	2200
Room Air Conditioner: 10,000 BTU	1500	2200
Central Air Conditioner (for 2200 sq. ft. home*)	10,000	11,250
Small Appliance	200	1700
Contractor		
8in. Bench Grinder	1400	2500
Pressure Washer: 1 HP	1200	3600
7-1/4in. Circular Saw	1400	2300
Electric Chain Saw: 14in. Bar, 2 HP	1100	0
10in. Table Saw	1800	4500

Wattage Chart

	Running Wattage Required	Surge Wattage Required at Startup
Drill: 3/8in., 4 Amps	440	600
Drill: 1/2in., 5.4 Amps	600	900
Industrial Motors		
Split Phase: 1/4 HP	600	1000
Split Phase: 1/2 HP	875	2300
Capacitor Start Induction Run: 1/3 HP	720	1300
Capacitor Start Induction Run: 1 HP	1600	4500
Capacitor Start Capacitor Run: 1 1/2 HP	2000	6100
Fan Duty: 1/6 HP	550	850
Farm Equipment		
Electric Fence: 25 Miles	2500	0
Milk Cooler	1100	1800
Milker (Vacuum Pump): 2 HP	1000	2300
Portable Heater (Kerosene, Diesel Fuel): 50,000 BTU	400	600
Portable Heater (Kerosene, Diesel Fuel): 90,000 BTU	500	725
Portable Heater (Kerosene, Diesel Fuel): 150,000 BTU	625	1000
Battery Charger: 15 Amp	380	0
Battery Charger: 60 Amp with 250 Amp Boost	1500/5750	0
Battery Charger: 100 Amp with 300 Amp Boost	2400/7800	0
Electric Welder: 200 Amp AC	9000	0
Electric Welder: 230 Amp AC at 100 Amp	7800	0
Computers		
Desktop	600-800	0
Laptop	200-250	0
Monitor	200-250	0
Fax	600-800	0
Printer	400-600	0

*Based on average-sized unit. Central air conditioners differ in wattage requirements; consult owner's manual for specific wattage requirements.

Finally, add together the wattage requirements for all the electrical devices that you want to run, to determine the minimum continuous wattage, or start at the same time, to determine the minimum surge wattage, you will need from a generator.

Typical Home Standby Power Needs

Customer Type	One Item at a time	Two Items at a time	All Items at once
Example #1			
Lights	2.4kw		
Color Television	2.4kw		
Furnace Fan	2.4kw		
Freezer	2.4kw	4.5kw	6.6kw
Refrigerator	2.4kw		
Sump Pump	4.5kw		
Example #2			
Includes Example #1 and central air	4.5kw	6.6kw	10.5kw
Example #3			
Includes Example #1 and a well pump	4.5kw	6.6kw	10.5kw
Example #4			
All of the above	4.5kw	6.6kw	13.5kw

When in doubt, remember that under sizing can damage equipment!

Extension Cords

Current Power		Maximum Extension Cord Length			
Amps at 240V	Load (watts)	#10 Ga. Cord	#12 Ga. Cord	#14 Ga. Cord	#16 Ga. Cord
10	2400	250 ft.	150 ft.	100 ft.	75 ft.
20	4800	125 ft.	75 ft.	50 ft.	25 ft.
30	7200	60 ft.	35 ft.	25 ft.	10 ft.
40	9600	30 ft.	15 ft.	10 ft.	NA
50	12000	15 ft.	NA	NA	NA

WARNING: Use of undersized or damaged extension cords can cause electric shock, fire, or damage to connected devices. All extension and appliance cords must be in good condition and not worn, bare, frayed or otherwise damaged. If an extension cord becomes hot to the touch, it is overloaded or damaged and must be replaced.