Basics of Selecting an Inverter

Fill out the work sheet on this page to determine the inverter/battery power package that fits your individual needs.

Sizing an inverter

Sizing your system is elementary math. Power is measured in watts. A light bulb, for instance, may require 40 watts of power, a blender 400. Appliance wattage is usually listed on the manufacturer's label. If only amperage is listed, the formula to determine watts is as follows: amps x volts = watts.

The amount of power you will take out of the battery will depend upon the relationship between the size of your load and the time it is operating. Your battery bank should be big enough to supply power to your anticipated "electrical wish list" (see right) for at least a few days

Choosing the right size inverter is based on a few major considerations. First and foremost is the largest single load which will be operated by the inverter. Another factor to consider is the largest group of loads which may run at onetime. For example, a system which has a 1 kW electric motor on a washing machine and 1kW automatic water pump in the well has the potential to have a 2 kW load operating. The inverter must be large enough to handle either maximum load condition.

Finally there is inrush current which is the peak power that the load will draw at the instant that it starts up. TVs, stereos, and drills have a surge rating 1 1/2 to 2 times their continuous ratings. Power-hungry loads with large motors, such as compressors, water pumps, refrigerators and air conditioners, may surge at start-up 3 to 4 times their run wattage. Most people have seen the effects of inrush current when a refrigerator starting up momentarily dims the lights.

We recommend that you add at least 25% to whatever you come up with to allow room for system growth.

Example

STEP 1: Determine your daily energy budget: (Hours of use times watts equals daily watt hours used.)

AC Appliance	Hours of Daily Usage X	Appliance Watts =	Daily Watt Hours Used
Microwave	.5	600	300
Lights (x4)	6	40	240
Hair Dryer	.75	750	563
Television	4	100	400
Washing Machine	1	375	375

Add lines 1-6 → Total Daily Watt Hs. Used: 1,878

x days of autonomy

Specify: Autonomy _____ System voltage _____ VDC

STEP 2: Multiply total daily watt hours used by number of anticipated days of autonomy (days between charging, usually between 1 to 5) to determine your Rough Battery Estimate. → Rough Battery Estimate: 5,634

x 2

STEP 3: Multiply Rough Battery Estimate x 2, to determine safe battery size in watt hours. (This allows for 50% maximum battery discharge in normal operation and an additional 50% in emergency situations.) → Safe Battery Size in Watt Hs.: 11,268

÷ system voltage

STEP 4: Convert safe battery size to amp hours. The formula is: Safe Battery Size in watt hours ÷ DC system voltage. (i.e., 12, 24, or 48, volts DC = Safe Battery Size in Amp Hours.) → Safe Battery Size in Amp Hs.: 470

To properly determine inverter size add together the appliances that must/will run at the same time, from column 3 (Appliance Watts, listed above) and add 25% then round up to the next inverter wattage size. → Properly sized inverter wattage: 2,500

Worksheet

STEP 1: Determine your daily energy budget: (Hours of use times watts equals daily watt hours used.)

AC Appliance	Hours of Daily Usage X	Appliance Watts =	Daily Watt Hours Used

Add lines 1-5 → Total Daily Watt Hs. Used

x days of autonomy

Specify: Autonomy _____ System voltage _____ VDC

STEP 2: Multiply total daily watt hours used by number of anticipated days of autonomy (days between charging, usually between 1 to 5) to determine your Rough Battery Estimate. → Rough Battery Estimate

x 2

STEP 3: Multiply Rough Battery Estimate x 2, to determine safe battery size in watt hours. (This allows for 50% maximum battery discharge in normal operation and an additional 50% in emergency situations.) → Safe Battery Size in Watt Hs.

÷ system voltage

STEP 4: Convert safe battery size to amp hours. The formula is: Safe Battery Size in watt hours ÷ DC system voltage. (i.e., 12, 24, or 48, volts DC = Safe Battery Size in Amp Hours.) → Safe Battery Size in Amp Hs.

To properly determine inverter size add together the appliances that must/will run at the same time, from column 3 (Appliance Watts, listed above) and add 25% then round up to the next inverter wattage size. → Properly sized inverter wattage