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Smart Office Toolkit – Energy Cheat Sheet

How much electricity do appliances use?

The easiest is to just look at the label! Nearly everything you can plug into the wall has a label that says how much electricity it uses. It may be printed directly into the plastic or metal and you may have to hunt for the label. It's often located on the bottom or side of the device, or possibly where the power cord enters the unit. If the device is powered with an AC/DC adapter, the electrical rating is usually listed on the adapter itself.

If the label only gives the number of amps and not the number of watts, then just multiply the amps by the volts to get the number of watts. Most electricity in South Africa is 220/230 Volts, alternating at 50 cycles per second (50Hz) and Amps x Volts = Watts. So a hot plate that uses 6 amps uses 6 x 230 = 1380 watts. Most countries use 220/240 volts, but America and Japan use 120 volts.

Note that if a device is powered by a transformer (one of those great big plugs), then the transformer has converted the electricity from AC to DC, so you need to multiply by the DC voltage, not the AC voltage of 120. For example, if the device says "INPUT 9V, 0.5A", then that's 9 volts x 0.5 amps = 4.5 watts.

You may have noticed that appliances may be labelled 220, 230, or 240 volts. Appliances are actually designed to accept a range of voltages, between 220-240 volts, and the exact voltage coming out of your electrical socket can vary depending on conditions at the power plant and in your own home. Let's just agree that when we say 240 volts, we understand that it's actually a range from 220-240 and just use 220 volts for your calculations (unless you're in North America or Japan, in which case you probably have 120 volts).

Your device might actually list a huge voltage range, like 100-240V. That means that it will work with any country's voltage. For your calculations, use the voltage for the country where you're plugging the device in.

A few important notes

The amount of electricity listed on the label is the *maximum* amount that the appliance will ever use. For example, a 300-watt refrigerator will only run at 300 watts when the compressor is running (which is when it makes that humming sound, indicating that it's actually chilling the air inside). Most of the time the fridge just sits there, using only 5 watts or so for its electronics, but picks up when you open the door.

If the amount of work done by a device varies, then so does its energy use. (e.g., a stereo that can be turned up or down, an oven that can be set at various temperatures, a fridge that sometimes runs and sometimes doesn't, a computer that sometimes spins its various drives and sometimes

has to use more of its ‘brainpower’, etc.) The label on computers is particularly misleading: a computer labelled at 300 watts uses only about 65 watts.

Many consumer items are advertised according to their power *output*, not *input*. That means the stereo that says 30 watts on the box might actually require 50 watts to make 30 watts of sound (assuming the volume was cranked), and your 900-watt microwave oven might actually use 1400 watts (on its highest setting). That's because all electrical devices are inefficient -- they have to use some extra energy to do what they do.

Knowing how much electricity a device uses at a given moment doesn't tell you how much it's using in a month, because it's probably not running 24/7 (and if it *is* running 24/7 like a fridge, it's probably not using the maximum amount of electricity, as we discussed earlier). To measure how much electricity something uses for a certain period of time (like a week or a month), you can use a watt-meter.

Some devices use a small amount of electricity even when they're not on. For example, VCRs and microwaves draw a small amount to power the time display. This amount is often 5 watts or less. Devices that run off transformers also draw a small amount of power even when perceived to be “not in use”. Electricity consumption of a device varies from brand to brand, and condition to condition.

Difference between energy consumption and demand

Eskom typically charge commercial and industrial customers for both consumption (kWh) and demand (kVA). You should be able to find information about this on your utility bill. The primary difference between kilowatt (kW) and kilovolt-ampere (kVA) is the power factor. To explain power factor we can compare the delivery of electricity energy in a motor to the delivery of milk to a home, in the days when refillable glass bottles were used.

The bottles were essential to the transaction, but were not paid for or consumed by the customer. They were washed and returned to the dairy each day. The load the milkman had to carry to the house consisted of both milk and glass.

- Milk = Watts, (true power or consumption) the product consumed and paid by customer
- Glass = Vars, (reactive power) required to supply the magnetic field, returned to the power generator each cycle, not consumed or paid for by the customer
- Milk + Glass = VA, (apparent power or demand) the vector sum of the Watts and Vars, which is what the transformers and conductors have to carry.

Cheat Sheet

This cheat sheet provides a list of generic wattage readings for some appliances, but can be used if there is no indication on the appliance. This should be used when you do a detailed energy audit to determine where energy is used. Also refer to the Smart Living Handbook, which is available at www.capetown.gov.za/smartliving

Appliance	Power Use (Watt)	Average hours in use per day (h/d)
Lighting		
Incandescent bulb (“old”)	40 / 60 / 100	Varies on area of use
Compact fluorescent lights (CFL)	12 / 18 / 20	Varies on area of use
Fluorescent lights	18 / 36 / 38	Varies on area of use
Spot lights / down lights	20 / 50	Varies on area of use
Security – various types	120	0.3
Cooking		
Electric stove	3000	2
Frying pan	1250	0.4
Hotplate large	2400	0.3
Hotplate small	1275	0.2
Microwave oven	600 / 1200	0.8
Snackwich	1200	0.3
Kettle	1900	0.3
Toaster	800 / 1500	0.3
Coffee machine (4 cups)	670	0.5
Food processor	166	0.2
Refrigeration		
Freezer (chest)	105	0.4
Fridge with freezer	150	5
Fridge no freezer	250	0.2
Home maintenance		
Dishwasher	2500	0.9
Vacuum cleaner	1000	0.5
Floor polisher	400	0.5
Laundry		
Iron	980	0.4
Iron (steam)	1235	0.8
Washing machine - front loader	3000 average	0.75 per load
Washing machine - top-loader	5240 for hot wash	0.90 per load

Washing machine - top-loader	3580 for warm wash	0.60 per load
Washing machine - top-loader	260 for cold wash	0.30 per load
Tumble dryer	3300 – 4400	0.5 per load
Entertainment		
Compact disc (CD) player	9	0.4
Radio	12 / 70 / 400	3
M-Net decoder	28	12.1
Video recorder (VCR)	17 – 22	4.7
DVD Player	20 – 25	4.7
Games (Wii, Nintendo, X-Box)	70 / 165 / 250	Too many!
Geyser		
Geyser (electric)	2600	4.4
Geyser (solar with elec. backup)	2600	1.7
Space heating		
Air conditioner (small, medium, large)	500 /1000 /1440	2.4
Central air conditioning (2.5 tons)	3500	
Central AC fan, no cooling	750	
Desk / floor fan	100	
Ceiling fan (36”, 48”, 52” on high)	55 / 75 / 95	
Built in extractor fan (9”, 12”)	45 - 105	
Electric blanket	133	5.5
Heater oil (big)	1850	1.8
Heater oil (small)	1240	0.3
Heater fan	2000	1.9
Heater capillary	1500	2.2
Heater 1 bar	779	1
Heater 2 bars	1320	1.4
Heater 3 bars	2000	2.2
Computers		
Modem	8 / 12	24
Printer – ink jet	120	0.1
Printer – laser jet	250 - 500	0.1
Desktop computers	120 - 155 (4 on stand-by)	

Laptops	30 - 50 (4 on stand-by)	
Network servers		
Computer	134	1.5
Typical 17" CRT Monitor	80	
Typical 17" LCD Monitor	35	
Apple MS 17" CRT, mostly white (blank IE window)	63	
Apple MS 17" CRT, mostly black (black Windows desktop with just a few icons)	54	
Sleeping monitor (dark screen)	8	
Monitor turned off at switch	5	
TV : Small black and white	30	6
TV : CRT (big bulky TV, 18”)	80	6
TV : LCD (flat screen, 32” – 52”)	125 / 280	6
TV : DLP (large rear projection, 56”)	175	6
TV : Plasma (energy hogs, 32”- 60”)	125 - 340	6
TV : OLED		6
UPS (uninterrupted power supply)	800 - 1200	24
Other		
Cordless phone	2	15
Fax machine	45	13.6
Hair drier	649	0.1
Sewing machine	100	0.4
Answering machine	5	15.6
Cell phone charger	9	2
Burglar alarm	10	24
Alarm clock / radio	10 - 20	24
Small CCTV camera	2000	24
Garage door / gates	300	0.5
Aquarium	50 – 1210	
Dehumidifier	785	
Water cooler	80	
Industrial kitchen		
Pizza grill / salamander	3000	

Bain Marie (table top)	2500	
Slicer	220 - 260	
Electric insect control (UV tubes)	6 / 8 /12 per tube	
Coffee grinder	275	
Dishwasher (20 – 30 litres)	9000 / 1200	
Electric scale	130	
Hot pass / food warmer	1500	
Deep fryer (chips etc.	2500	
Fridge – four door under counter	350	
Hot water urn	300	
Chicken rotisserie	3000	
Popcorn machine	1500	
Pie warmer	1800	
Vacuum pack machine	450 / 900	
Cake mixer	320 – 900	
Ice maker (55 kg ice)	650 - 1000	

Glossary

Watt (W)	The rate of energy being used every second. True power or consumption.
Joule (J)	A Joule is a Watt second, so 1 Watt hour is the same as 3600J.
KWh	Electricity bills are normally calculated in Kilowatt-hours. 1000 Watt hour = 1KWh.
KVA	KiloVoltAmps is the apparent power or demand that is required. It is calculated by the vector sum of the Watts and Vars, which is what the transformers and conductors have to carry.
Vars	The reactive power required to supply the magnetic field and returned to the power generator each cycle, not consumed or paid for by the customer.
British thermal unit (BTU)	The power of HVAC (heating, ventilation and air condition is sometimes expressed in BTU/hour (the rate of cooling and dehumidifying or heating) instead of watts. One British Thermal Unit (BTU) is the energy required to raise one pound of water one degree Fahrenheit, but the many different types of BTU are based on different interpretations of this “definition”. There are several units of energy (heat) in the HVAC industry, each slightly more than 1 kJ.

Adapted from: http://michaelbluejay.com/electricity/howmuch.html