# Electrical

**Question1:- Can I put a timer on a water boiler so that it will go on even if I'm not home?**

**Answer: -**Of course you can. In Israel you usually have a choice of either replacing the existing water boiler switch with one that incorporates a timer, or installing a timer in the electrical panel to control the boiler line. A reliable electrician can tell you which would be best in your case.

**Question2:- What is the difference between a transformer, a converter and a power supply?**

**Answer:-**A Transformer is an electrical device by which alternating current of one voltage is changed to another voltage using coils. There are several different types, but they all basically do the same thing - change the voltage. They are usually heavy for their size due to the weight of the coils (size and weight depends on their rating).

A Converter is an electronic device that is used in some cases instead of a transformer. The converter doesn't actually lower the voltage, but rather delays each electrical cycle making the device think it is working with the proper voltage (does not produce an output of full sine wave electricity). If you were to measure with a voltmeter the output of the converter, it would actually measure 220V (in Israel). These converters are not to be used with any electronic devices, and I personally do not recommend using them with ANY device. Although they are sold for use with hair dryers, bottle warmers, irons, etc, I've seen too many of these appliances ruined when used with a converter.

In actual fact, anything that supplies power is a Power Supply. But usually when people talk about power supplies, they are talking about a device that not only lowers the voltage, but also converts AC (alternating current) to DC (direct current). These are what you find on many small electronic devices (walkman, cordless telephones, desk clocks…etc), looking like a small black box that gets plugged in the receptacle, and having a cord that plugs into whatever device you're using. If you come from the US with a device using a power supply of this type rated for 110V, simply buy the 220V equivalent here in Israel. They are relatively inexpensive and work exactly like their 110V cousin. Make sure to bring the 110V power pack with you so you can be sure of buying exactly what you need.

**Question3:- I am told that using my air conditioner for heating costs less than using regular electric room heaters. Is this true?**

**Answer: -**Electric resistance heat (your small electric heater) works by converting electric current into heat. These heaters come in a wide variety of types and designs (baseboard heaters, radiant, convection space heaters...). All convert almost all of the electric current to usable heat and are generally considered to be 98-100 percent efficient. However, it is usually considered one of the most expensive means of heating.

Air-conditioning units use a heat pump system to heat your home. Heat pumps use electricity to move heat from one place to another. During the winter, the heat is directed inside your home while the cold air is thrown outside. The reverse is done in the summer to cool your home off. This form of heating is much more economical.

All this notwithstanding, I’m not sure that I would recommend purchasing an air conditioning unit just for the heating. In my opinion, it would take too

many years to save enough in heating costs to warrant the cost of the unit itself (which can be costly). But if you intend to buy an air conditioner for the summer months anyhow, or already have one installed, by all means use it in the winter for heating and save on your heating costs.

**Question4:- Sometimes the main breaker jumps but none of the smaller ones do. Why does that happen?**

**Answer: -**A basic, standard electrical panel found in many homes includes, in addition to other parts, a main breaker, and other "line" breakers. The main breaker supplies electricity to the line breakers, and is rated at a higher current rating (usually 25 or 40 amps in a standard one phase system). The other breakers supply electricity to the various lines around your home (usually rated between 10–20 amps).

Let’s assume that your main breaker is rated at 25 amps, and you have 5 other breakers rated at 10 amps each. Now let us suppose that you are using on each line (each 10 amp breaker) only 8 amps. Each 10 amp breaker, having only 8 amps going through it, would be fine. They would have no reason to trip. But if you add up what each breaker is using, you get 40 amps. This is way over the amount that your main breaker is rated for, and will therefore cause it to trip.

**Question5:- Both the main breaker and the main ground-fault interrupter turn off everything in the house. What is the difference between them?**

**Answer:-**True, in a standard Israeli panel, both the ground-fault and the main breaker shut off everything in the home. But they both jump for completely different reasons.

A breaker basically cares how much current is going through it and it really doesn’t care what you do with it. So, for example, if you had an outlet on a 16 amp line (breaker). You can plug in a heater, toaster, hairdryer, and even stick your finger in the socket (G-d forbid), but as long as you don’t take more than what the breaker is rated for (16A in this case), it will continue to work.

The ground-fault interrupter (GFI) on the other hand, even though it’s physically built for a range of current, it really doesn’t care how much current is going through it. Whether it’s 10A, 16A, 25A, or 1000A - as long as what is going in is making a complete circuit, and nothing is escaping, the GFI is quite happy to continue working. BUT, once some current “leaks” from the line out to someplace else, the GFI will jump immediately. This is why it is sometimes referred to as “The Safety Device”. If someone would, G-d forbid, stick their finger in an outlet, part of the electricity from the line would flow through their body and on to the ground that they are standing on. The ground-fault would sense this (that not all the electricity going into the line is through the proper circuit) and jump, possibly saving his/her life.

You can have a situation where both the ground-fault and the main breaker (or specific line breaker) jump together. That would happen when a live wire shorts with something other than the neutral wire (i.e.: if the live wire of a room heater shorts with its metal body).

To summarize, the breaker jumps when too much current is being used (including a short), and the ground-fault jumps when there is a leakage of current from the line.

**Question6:- Can I simply upgrade my breaker to one with a higher rating, so to keep it from jumping all the time?**

**Answer: -**Definitely not! Each breaker in your panel is there for the sole purpose of protecting the wires that run through that particular line. If, for example, the wires are a size that need a 10A breaker to protect them, and you were to switch the breaker to a 20A, you would be causing a potentially dangerous situation. There would be nothing to protect the wires from burning up and taking the whole house with them.

**Question7:- Why does my florescent fixture make a humming sound?**

**Answer: -**The ballast in florescent fixtures often causes a humming sound while the fixture is on. There are a number of possible causes for this. One cause could possibly be loose laminations in the core. However, manufacturers claim that this is not common.

Another, more likely cause, can be magnetostriction. Magnetostriction is the deformation of a ferromagnetic material subjected to a magnetic field. In other words, when the magnetic field produced by the ballast slightly changes the positions of the molecules in the metal, this creates a constant cycle of shrinkage and expansion that produces an audible hum.

Another possible cause, (or at least may contribute to the cause) is the way the ballast is mounted onto the surface. A simple fix is to install vibration-isolation pads between the ballast and its mounting surface to dampen the noise.

**Question8:-Can I get electrocuted by batteries?**

**Answer: -**You sure can, but you would need a lot of batteries to accomplish this. Regular everyday batteries are safe because they have such low voltage.

You need a high enough voltage in order to get the current flowing through your body. Human skin is not a good conductor. It takes about 40 volts, or more, of electrical pressure to penetrate your skin and create an electrical current inside your body dangerous enough to harm you. Most of the batteries we use are 12 volts or less. On the other hand, if the current finds a way to penetrate the skin (through a cut or other opening), then even a 12V battery could be dangerous.

**Question9:- What do the colors of the plastic insulation mean on wires?**

**Answer: -**They are designed to indicate their use. In Israel, the wires carrying current at full voltage are usually brown. Neutral wires are usually blue. Ground wires are usually yellow with a green stripe. Much caution must be applied, because wires are not always hooked up correctly. There are also older houses wired with the “old” colors, which are red (hot wire), black (neutral), white (ground), and blue (returning hot).

**Question10:- I have never had a doorbell installed. Is there an easy and quick way to install one?**

**Answer: -**Yes. You can install a wireless doorbell.

**Question11:- How can I know how many amperes my appliance uses?**

**Answer: -**The easiest way is to simply look for where it is written on the appliance. Many appliances have it marked somewhere. If not, then you can divide the watts by the volts (example: 2000 watts / 220 volts = 9.09amps). This isn't 100% accurate because you usually have other elements that come into play, such as efficiency and a power factor. But for a "ball park" calculation it's probably good enough.

**Question12:- How can I stop static electricity?**

**Answer: -**An electric charge is produced when two pieces of material are rubbed together, such as when you walk across a carpet and get a shock when you touch an object. In this example, you are building up a charge by having your shoes rub on the carpet, and this charge is transferred to you and is discharged on the object. These charges are called static electricity. You get static electricity when one material (even insulators such as rubber or glass) transfers its electrons to another.

Static electricity occurs quite often when the weather gets cold and the moisture in the air is low. Therefore, adding moisture to the air would be a big help. Grounding is the best way of removing static electricity, but is not always practical. Using humidifiers or placing water next to heating ducts can help. Moisture in the air will be absorbed by the carpet fibers. Some carpets are made out of antistatic materials.

**Question13:-Why do we use AC electricity instead of DC in our homes?**

**Answer: -**Power is the product of voltage x current (P = VI). For any given amount of power, a low voltage requires a higher current, thus requiring a larger size conductor (P = I2R) to transfer it from one place to another.

Therefore it is more economical to transfer power using high voltage, thus requiring a smaller diameter cable.

It is very difficult to transform DC power to a high-voltage, low-current form efficiently; therefore it is not transmitted for distances greater than one mile without introducing excessive voltage drops.

On the other hand, AC power can be changed with ease using transformers to change the voltages. This makes it much more practical to use for distributing purposes. Even in your home, AC transformers can be found in use with many appliances.