Electricity around the world

Click here for French / *Click here for Dutch*

(last update: 18 April 2011)

Save this page to PDF

There is no standard mains voltage throughout the world and also the frequency, i.e. the number of times the current changes direction per second, is not everywhere the same. Moreover, plug shapes, plug holes, plug sizes and sockets are also different in many countries. Those seemingly unimportant differences, however, have some unpleasant consequences.
Most appliances bought overseas simply cannot be connected to the wall outlets at home. There are only two ways to solve this problem: you just cut off the original plug and replace it with the one that is standard in your country, or you buy an unhandy and ugly adapter.

While it is easy to buy a plug adapter or a new "local" plug for your "foreign" appliances, in many cases this only solves half the problem, because it doesn't help with the possible voltage disparity. A 120-volt electrical appliance designed for use in North America or Japan will provide a nice fireworks display - complete with sparks and smoke - if plugged into a European socket.

It goes without saying that the lack of a single voltage, frequency and globally standardised plugs entail many extra costs for manufacturers and increase the burden on the environment.

Pure waste and unnecessary pollution !

BACK TO MAIN PAGE

Single-phase voltage and frequency

Europe and most other countries in the world use a voltage which is twice that of the US. It is between 220 and 240 volts, whereas in Japan and in most of the Americas the voltage is between 100 and 127 volts.

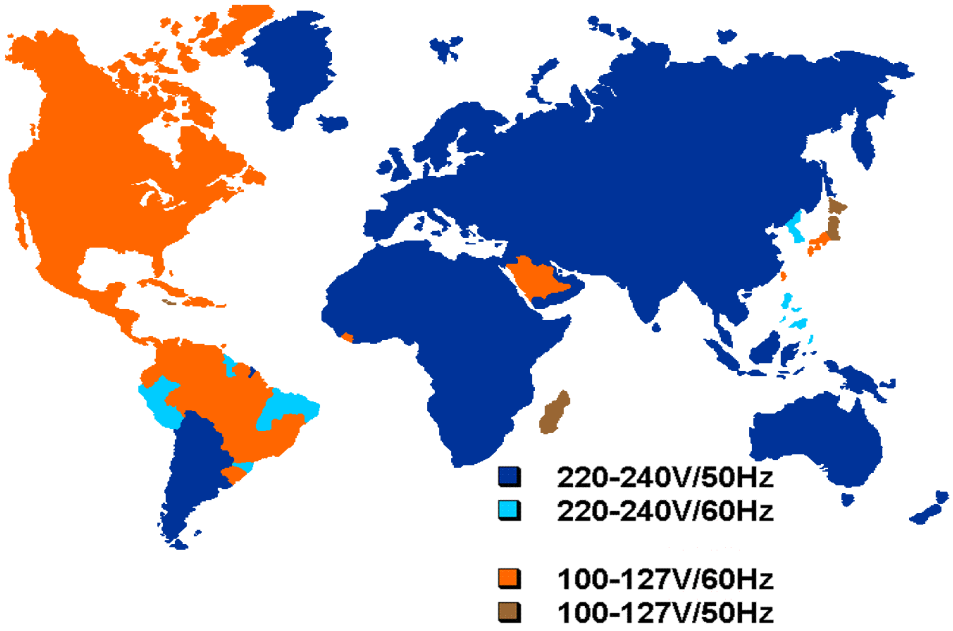
The system of three-phase alternating current electrical generation and distribution was invented by a nineteenth century creative genius named Nicola Tesla. He made many careful calculations and measurements and found out that 60 Hz (Hertz, cycles per second) was the best frequency for alternating current (AC) power generating. He preferred 240 volts, which put him at odds with Thomas Edison, whose direct current (DC) systems were 110 volts. Perhaps Edison had a useful point in the safety factor of the lower voltage, but DC couldn't provide the power to a distance that AC could.

When the German company AEG built the first European generating facility, its engineers decided to fix the frequency at 50 Hz, because the number 60 didn't fit the metric standard unit sequence (1, 2, 5). At that time, AEG had a virtual monopoly and their standard spread to the rest of the continent. In Britain, differing frequencies proliferated, and only after World War II the 50-cycle standard was established.

Originally Europe was 120 V too, just like Japan and the US today. It has been deemed necessary to increase voltage to get more power with less losses and voltage drop from the same copper wire diameter. At the time the US also wanted to change but because of the cost involved to replace all electric appliances, they decided not to. At the time (50s-60s) the average US household already had a fridge, a washing-machine, etc., but not in Europe.

The end result is that the US is still evolving from the 50s and 60s, and - mostly in older buildings - still copes with problems as light bulbs that burn out rather quickly when they are close to the transformer (too high a voltage), or just the other way round: not enough voltage at the end of the line (105 to 127 volt spread !).

Note that currently all new American buildings get in fact 240 volts split in two 120 between neutral and hot wire. Major appliances, such as virtually all drying machines and ovens, are now connected to 240 volts. Mind, Americans who have European equipment shouldn't connect it to these outlets. Although it may work on some appliances, it will definitely not be the case for all of your equipment.



Google™ Custom Search Search

Look-up table (single-phase voltage, frequency and plug/sockets)

There are 214 countries listed below. 175 of the countries mentioned use 220-240 volts (50 or 60 Hz). The 39 other countries use 100-127 volts.

A B C D E F G H I J K L M N O P Q R S T U V W X Y Z

COUNTRY	SINGLE-PHASE VOLTAGE	FREQUENCY	PLUG TYPE	SOCKET TYPE
Afghanistan	220 V	50 Hz	C / F	C / F
Albania	230 V	50 Hz	C / F	C / F
Algeria	230 V	50 Hz	C / F	C / F
American Samoa	120 V	60 Hz	A / B / F / I	A / B / F / I
Andorra	230 V	50 Hz	C / F	F
Angola	220 V	50 Hz	C	C
Anguilla	110 V	60 Hz	A	A
Antigua	230 V	60 Hz	A / B	A / B
Argentina	220 V	50 Hz	C / I *	C / I *
Armenia	230 V	50 Hz	C / F	C / F
Aruba	120 V	60 Hz	A / B / F	A / B / F
Australia	230 V	50 Hz	I	I
Austria	230 V	50 Hz	C / F	F
Azerbaijan	220 V	50 Hz	C / F	C / F
Azores	230 V	50 Hz	B / C / F	B / C / F
Bahamas	120 V	60 Hz	A / B	A / B
Bahrain	230 V	50 Hz	G	G
Balearic Islands	230 V	50 Hz	C / F	F
Bangladesh	220 V	50 Hz	C / D / G / K	C / D / G / K
Barbados	115 V	50 Hz	A / B	A / B
Belarus	220 V	50 Hz	C / F	C / F
Belgium	230 V	50 Hz	C / E	E
Belize	110 V / 220 V	60 Hz	B / G	B / G
Benin	220 V	50 Hz	C / E	E
Bermuda	120 V	60 Hz	A / B	A / B
Bhutan	230 V	50 Hz	C / D / F / G	D / F / G
Burma *(officially Myanmar)*	230 V	50 Hz	C / D / F / G	C / D / F / G
Bolivia	230 V	50 Hz	A / C	A / C
Bosnia & Herzegovina	230 V	50 Hz	C / F	F
Botswana	230 V	50 Hz	D / G	D / G
Brazil	127 V / 220 V *	60 Hz	C / N	N **

Brunei	240 V	50 Hz	G	G
Bulgaria	230 V	50 Hz	C / F	F
Burkina Faso	220 V	50 Hz	C / E	C / E
Burundi	220 V	50 Hz	C / E	C / E
Cambodia	230 V	50 Hz	A / C / G	A / C / G
Cameroon	220 V	50 Hz	C / E	C / E
Canada	120 V	60 Hz	A / B	A / B
Canary Islands	230 V	50 Hz	C / E / L	C / E / L
Cape Verde	230 V	50 Hz	C / F	C / F
Cayman Islands	120 V	60 Hz	A / B	A / B
Central African Republic	220 V	50 Hz	C / E	C / E
Chad	220 V	50 Hz	C / D / E / F	D / E / F
Channel Islands (Guernsey & Jersey)	230 V	50 Hz	C / G	C / G
Chile	220 V	50 Hz	C / L	C / L
China, People's Republic of	220 V	50 Hz	A / C / I	A/ C / I
Colombia	110 V	60 Hz	A / B	A / B
Comoros	220 V	50 Hz	C / E	C / E
Congo, People's Rep. of	230 V	50 Hz	C / E	C / E
Congo, Dem. Rep. of *(formerly Zaire)*	220 V	50 Hz	C / D / E	C / D / E
Cook Islands	240 V	50 Hz	I	I
Costa Rica	120 V	60 Hz	A / B	A / B
Côte d'Ivoire (Ivory Coast)	220 V	50 Hz	C / E	C / E
Croatia	230 V	50 Hz	C / F	F
Cuba	110 V / 220 V	60 Hz	A / B / C / L	A / B / C / L
Cyprus	230 V	50 Hz	C / G / F ***	G / F ***
Czech Republic	230 V	50 Hz	C / E	E
Denmark	230 V	50 Hz	C / E / K	E / K
Djibouti	220 V	50 Hz	C / E	C / E
Dominica	230 V	50 Hz	D / G	D / G
Dominican Republic	120 V	60 Hz	A / B	A / B
East Timor	220 V	50 Hz	C / E / F / I	C / E / F / I
Ecuador	120 V	60 Hz	A / B	A / B
Egypt	220 V	50 Hz	C / F	C / F
El Salvador	115 V	60 Hz	A / B / C / D / E / F / G / I / J / L	A / B / C / D / E / F / G / I / J / L
Equatorial Guinea	220 V	50 Hz	C / E	C / E
Eritrea	230 V	50 Hz	C / L	C / L
Estonia	230 V	50 Hz	C / F	F
Ethiopia	220 V	50 Hz	C / F	C / F
Faeroe Islands	230 V	50 Hz	C / K	K
Falkland Islands	240 V	50 Hz	G	G
Fiji	240 V	50 Hz	I	I
Finland	230 V	50 Hz	C / F	F
France	230 V	50 Hz	C / E	E
French Guyana	220 V	50 Hz	C / D / E	C / D / E
Gabon (Gabonese Republic)	220 V	50 Hz	C	C
Gambia	230 V	50 Hz	G	G
Gaza	230 V	50 Hz	H	H
Georgia	220 V	50 Hz	C / F	C / F
Germany	230 V	50 Hz	C / F	F
Ghana	230 V	50 Hz	D / G	D / G
Gibraltar	230 V	50 Hz	C / G	C / G
Greece	230 V	50 Hz	C / F	F
Greenland	230 V	50 Hz	C / K	K
Grenada (Windward Islands)	230 V	50 Hz	G	G
Guadeloupe	230 V	50 Hz	C / D / E	C / D / E
Guam	110 V	60 Hz	A / B	A / B
Guatemala	120 V	60 Hz	A / B / G / I	A / B / G / I
Guinea	220 V	50 Hz	C / F / K	C / F / K
Guinea-Bissau	220 V	50 Hz	C	C
Guyana	240 V	60 Hz	A / B / D / G	A / B / D / G
Haiti	110 V	60 Hz	A / B	A / B
Honduras	110 V	60 Hz	A / B	A / B

Hong Kong	220 V	50 Hz	G	G
Hungary	230 V	50 Hz	C / F	F
Iceland	230 V	50 Hz	C / F	F
India	230 V	50 Hz	C / D / M	C / D / M
Indonesia	230 V	50 Hz	C / F	C / F
Iran	230 V	50 Hz	C / F	C / F
Iraq	230 V	50 Hz	C / D / G	C / D / G
Ireland (Eire)	230 V	50 Hz	G	G
Isle of Man	230 V	50 Hz	C / G	C / G
Israel	230 V	50 Hz	C / H	H
Italy	230 V	50 Hz	C / F / L	F / L
Jamaica	110 V	50 Hz	A / B	A / B
Japan	100 V	50 Hz / 60 Hz **	A / B	A / B
Jordan	230 V	50 Hz	C / D / F / G / J	C / D / F / G / J
Kenya	240 V	50 Hz	G	G
Kazakhstan	220 V	50 Hz	C / F	C / F
Kiribati	240 V	50 Hz	I	I
Korea, North	110 V / 220 V	60 Hz	A / C	A / C
Korea, South	110V / 220 V	60 Hz	A / B / C / F	A / B / C / F
Kuwait	240 V	50 Hz	C / G	C / G
Kyrgyzstan	220 V	50 Hz	C / F	C / F
Laos	230 V	50 Hz	A / B / C / E / F	A / B / C / E / F
Latvia	230 V	50 Hz	C / F	F
Lebanon	230 V	50 Hz	C / D / G	C / D / G
Lesotho	220 V	50 Hz	M	M
Liberia	120 V	60 Hz	A / B	A / B
Libya	127 V / 230 V	50 Hz	C / D / F	D / F
Liechtenstein	230 V	50 Hz	C / J	J
Lithuania	230 V	50 Hz	C / F	F
Luxembourg	230 V	50 Hz	C / F	F
Macau	220 V	50 Hz	D / G	D / G
Macedonia	230 V	50 Hz	C / F	F
Madagascar	127 V / 220 V	50 Hz	C / D / E / J / K	C / D / E / J / K
Madeira	230 V	50 Hz	C / F	F
Malawi	230 V	50 Hz	G	G
Malaysia	240 V	50 Hz	G	G
Maldives	230 V	50 Hz	C / D / G / J / K / L	D / G / J / K / L
Mali	220 V	50 Hz	C / E	C / E
Malta	230 V	50 Hz	G	G
Martinique	220 V	50 Hz	C / D / E	C / D / E
Mauritania	220 V	50 Hz	C	C
Mauritius	230 V	50 Hz	C / G	C / G
Mexico	127 V	60 Hz	A / B	A / B
Micronesia, Federal States of	120 V	60 Hz	A / B	A / B
Moldova	230 V	50 Hz	C / F	C / F
Monaco	230 V	50 Hz	C / E / F	E / F
Mongolia	230 V	50 Hz	C / E	C / E
Montenegro	230 V	50 Hz	C / F	F
Montserrat (Leeward Islands)	230 V	60 Hz	A / B	A / B
Morocco	220 V	50 Hz	C / E	C / E
Mozambique	220 V	50 Hz	C / F / M	C / F / M
Myanmar *(formerly Burma)*	230 V	50 Hz	C / D / F / G	C / D / F / G
Namibia	220 V	50 Hz	D / M	D / M
Nauru	240 V	50 Hz	I	I
Nepal	230 V	50 Hz	C / D / M	C / D / M
Netherlands	230 V	50 Hz	C / F	F
Netherlands Antilles	127 V / 220 V	50 Hz	A / B / C / F	A / B / F
New Caledonia	220 V	50 Hz	C / F	F
New Zealand	230 V	50 Hz	I	I
Nicaragua	120 V	60 Hz	A	A
Niger	220 V	50 Hz	A / B / C / D / E / F	A / B / C / D / E / F
Nigeria	230 V	50 Hz	D / G	D / G

North Korea	110 V / 220 V	60 Hz	A / C	A / C
Norway	230 V	50 Hz	C / F	F
Oman	240 V	50 Hz	C / G	C / G
Pakistan	230 V	50 Hz	C / D	C / D
Palau	120 V	60 Hz	A / B	A / B
Panama	120 V	60 Hz	A / B	A / B
Papua New Guinea	240 V	50 Hz	I	I
Paraguay	220 V	50 Hz	C	C
Peru	220 V	60 Hz	A / B / C	A / B / C
Philippines	220 V	60 Hz	A / B / C	A / B / C
Poland	230 V	50 Hz	C / E	E
Portugal	230 V	50 Hz	C / F	F
Puerto Rico	120 V	60 Hz	A / B	A / B
Qatar	240 V	50 Hz	D / G	D / G
Réunion Island	230 V	50 Hz	C / E	E
Romania	230 V	50 Hz	C / F	F
Russian Federation	220 V	50 Hz	C / F	C / F
Rwanda	230 V	50 Hz	C / J	C / J
St. Kitts and Nevis (Leeward Islands)	230 V	60 Hz	D / G	D / G
St. Lucia (Windward Islands)	230 V	50 Hz	G	G
St. Vincent (Windward Islands)	230 V	50 Hz	A / C / E / G / I / K	A / C / E / G / I / K
Samoa	230 V	50 Hz	I	I
San Marino	230 V	50 Hz	C / F / L	F / L
Saudi Arabia	127 V / 220 V ***	60 Hz	A / B / C / G	A / B / C / G
Senegal	230 V	50 Hz	C / D / E / K	C / D / E / K
Serbia	230 V	50 Hz	C / F	F
Seychelles	240 V	50 Hz	G	G
Sierra Leone	230 V	50 Hz	D / G	D / G
Singapore	230 V	50 Hz	G	G
Slovakia	230 V	50 Hz	C / E	E
Slovenia	230 V	50 Hz	C / F	F
Somalia	220 V	50 Hz	C	C
South Africa	230 V	50 Hz	D / M ****	D / M ****
South Korea	110V / 220 V	60 Hz	A / B / C / F	A / B / C / F
Spain	230 V	50 Hz	C / F	F
Sri Lanka	230 V	50 Hz	D / G / M	D / G / M
Sudan	230 V	50 Hz	C / D	C / D
Suriname	127 V	60 Hz	C / F	C / F
Swaziland	230 V	50 Hz	M	M
Sweden	230 V	50 Hz	C / F	F
Switzerland	230 V	50 Hz	C / J	J
Syria	220 V	50 Hz	C / E / L	C / E / L
Tahiti	220 V	50 Hz / 60 Hz****	C / E	C / E
Tajikistan	220 V	50 Hz	C / F	C / F
Taiwan	110 V	60 Hz	A / B	A / B
Tanzania	230 V	50 Hz	D / G	D / G
Thailand	220 V	50 Hz	A / B / C / G	A / B / C / G
Togo	220 V	50 Hz	C	C
Tonga	240 V	50 Hz	I	I
Trinidad & Tobago	115 V	60 Hz	A / B	A / B
Tunisia	230 V	50 Hz	C / E	C / E
Turkey	230 V	50 Hz	C / F	F
Turkmenistan	220 V	50 Hz	C / F	C / F
Turks and Caicos Islands	120 V	60 Hz	A / B	A / B
Uganda	240 V	50 Hz	G	G
Ukraine	230 V	50 Hz	C / F	C / F
United Arab Emirates	240 V	50 Hz	G	G
United Kingdom	230 V	50 Hz	G	G
United States of America	120 V	60 Hz	A / B	A / B
Uruguay	220 V	50 Hz	C / F / I / L	C / F / I / L
Uzbekistan	220 V	50 Hz	C / F	C / F
Venezuela	120 V	60 Hz	A / B	A / B

Vietnam	220 V	50 Hz	A / C / G	A / C / G
Virgin Islands	110 V	60 Hz	A / B	A / B
Yemen, Rep. of	230 V	50 Hz	A / D / G	A / D / G
Zambia	230 V	50 Hz	C / D / G	C / D / G
Zimbabwe	240 V	50 Hz	D / G	D / G

* In Brazil there is no standard voltage. Click here for an exhaustive list of all 27 Brazilian federative units and their respective voltages.

** Although the mains voltage in Japan is the same everywhere, the frequency differs from region to region. Eastern Japan uses predominantly 50 Hz (Tokyo, Kawasaki, Sapporo, Yokohama, Sendai), whereas Western Japan prefers 60 Hz (Osaka, Kyoto, Nagoya, Hiroshima).

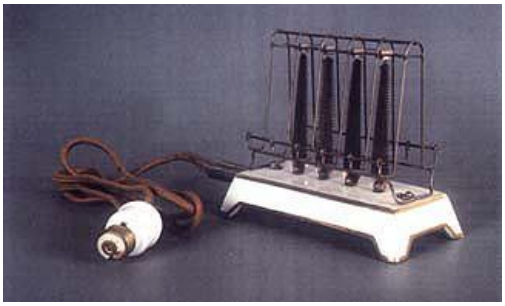
*** Saudi Arabia uses 127 V in many parts of the country, such as the Dammam and al-Khobar area (situated in the eastern province of Ash Sharqiyah). 220 V can be commonly found as well, especially in hotels.

**** In Tahiti the frequency is 60 Hz, except for the Marquesas archipelago where it is 50 Hz.

Plugs and sockets
(Look-up table)

When electricity was first introduced into the domestic environment it was primarily for lighting. However, as it became a viable alternative to other means of heating and also the development of labour saving appliances, a means of connection to the supply other than via a light socket was required. In the 1920s, the two-prong plug made its appearance.

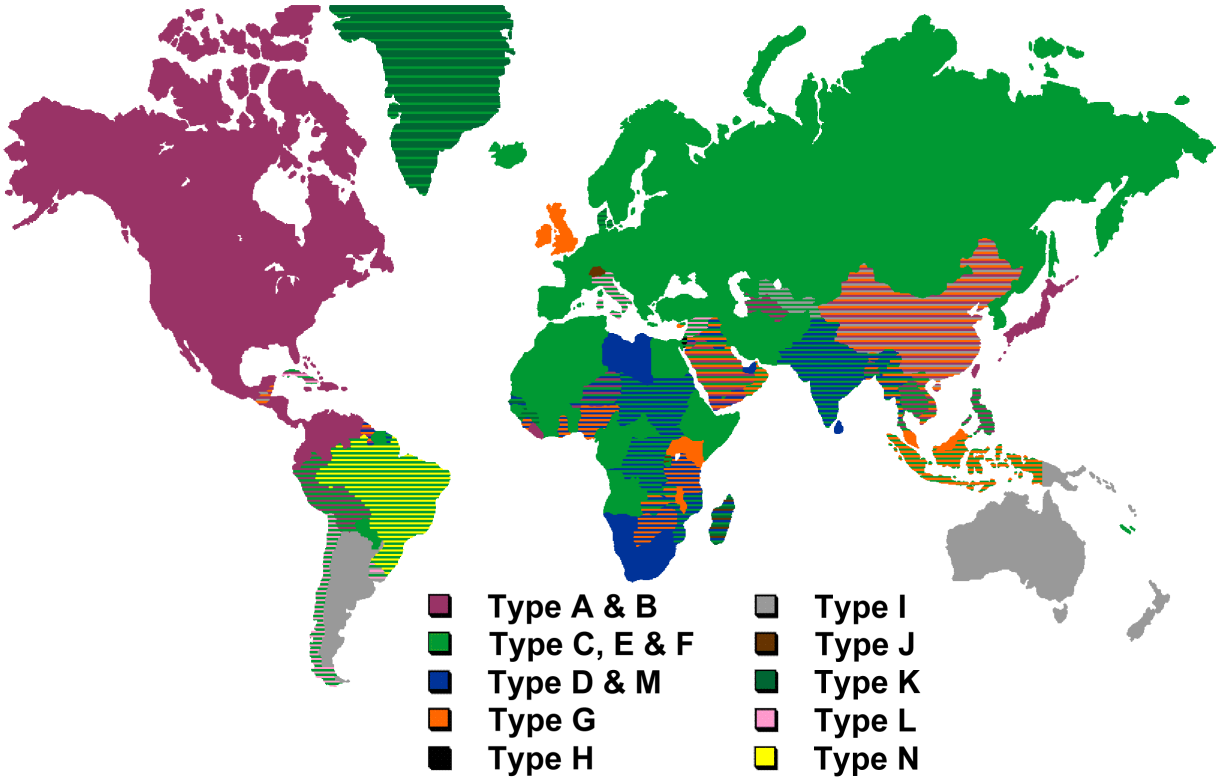
At that time, some electricity companies operated a split tariff system where the cost of electricity for lighting was lower than that for other purposes, which led to low wattage appliances (e.g. vacuum cleaners, hair dryers, etc.) being connected to the light fitting. The picture below shows a 1909 electric toaster with a lightbulb socket plug.



As the need for safer installations grew, three-pin outlets were developed. The third pin on the outlet was an earth pin, which was effectively connected to earth, this being at the same potential as the neutral supply line. The idea behind it was that in the event of a short circuit to earth, a fuse would blow, thus disconnecting the supply.

The reason why we are now stuck with no less than 13 different styles of plugs and wall outlets, is because many countries preferred to develop a plug of their own, instead of adopting the US standard. Moreover, the plugs and sockets are only very rarely compatible, which makes it often necessary to replace the plug when you buy appliances abroad.

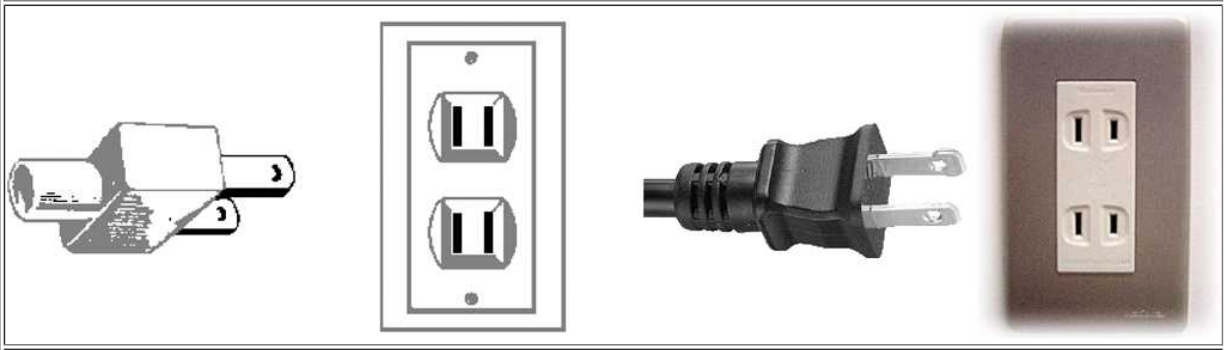
Below is a brief outline of the plugs and sockets used around the world in domestic environment. The outline map below visualises the spread of the different plug types used around the world. For easy reference, compatible plug types are represented with the same colour.



Search

TYPE A

(used in, among others, North and Central America and Japan) (Click here for a complete list of all countries that use type A)



This class II ungrounded plug with two flat parallel prongs is pretty much standard in most of North and Central America. At first glance, the Japanese plug and socket seem to be identical to this standard. However, the Japanese plug has two identical flat prongs, whereas the US plug has one prong which is slightly larger. Therefore it is no problem to use Japanese plugs in the US, but the opposite does not work often. Furthermore, Japanese standard wire sizes and the resulting current ratings are different than those used on the American continent.

Type A and B plugs have two flat prongs with a hole near the tip. These holes aren't there without a reason. If you were to take apart a type A or B socket and look at the contact wipers that the prongs slide into, you would find that in some cases they have have bumps on them. These bumps fit into the holes so that the outlet can grip the plug's prongs more firmly. This prevents the plug from slipping out of the socket due to the weight of the plug and cord. It also improves the contact between the plug and the outlet. Some sockets, however, don't have those bumps but just two spring-action blades that grip the sides of the plug pin, in which case the holes aren't necessary.

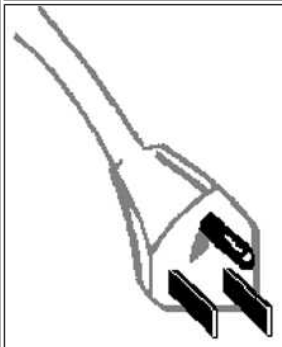
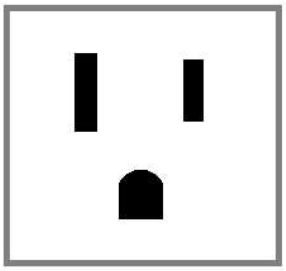
There are also some special outlets which allow you to lock the cord into the socket, by putting rods through the holes. This way, for example vending machines cannot be unplugged. Moreover, electrical devices can be "factory-sealed" by the manufacturer using a plastic tie or a small padlock through one or both of the plug prong holes. For example, a manufacturer might apply a plastic band through the hole and attach it to a tag that says: "You must do X or Y before plugging in this device". The user cannot plug in the device without removing the tag, so the user is sure to see the tag.

Type A and B plugs are among the most dangerous ones in the world: the prongs are not insulated (i.e. the pins don't have a black covering towards the plug body like type C, G, I, L or N plugs), which means that if a type A or B plug is pulled halfway out, its prongs are still connected to the socket! Little children run the risk of electrocuting

themselves when pulling such a plug out and putting their fingers around it.

TYPE B

(used in, among others, North and Central America and Japan) (Click here for a complete list of all countries that use type B)

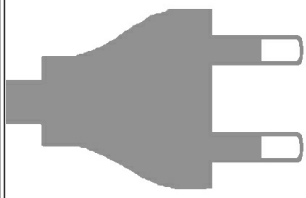
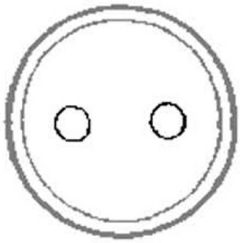
This is a class I plug with two flat parallel prongs and a grounding pin (American standard NEMA 5-15/Canadian standard CS22.2, n°42). It is rated at 15 amps and although this plug is also standard in Japan, it is less frequently used than in North America. Consequently, most appliances sold in Japan use a class II ungrounded plug. As is the case with the type A standard, the Japanese type B plugs and sockets are slightly different from their American counterparts.

An ungrounded version of the North American NEMA 5-15 plug is commonly used in Central America and parts of South America. It is therefore common for equipment users to simply cut off the grounding pin that the plug can be mated with a two-pole ungrounded socket.

Type A and B plugs are among the most dangerous ones in the world: the prongs are not insulated (i.e. the pins don't have a black covering towards the plug body like type C, G, I, L or N plugs), which means that if a type A or B plug is pulled halfway out, its prongs are still connected to the socket! Little children run the risk of electrocuting themselves when pulling such a plug out and putting their fingers around it.

TYPE C

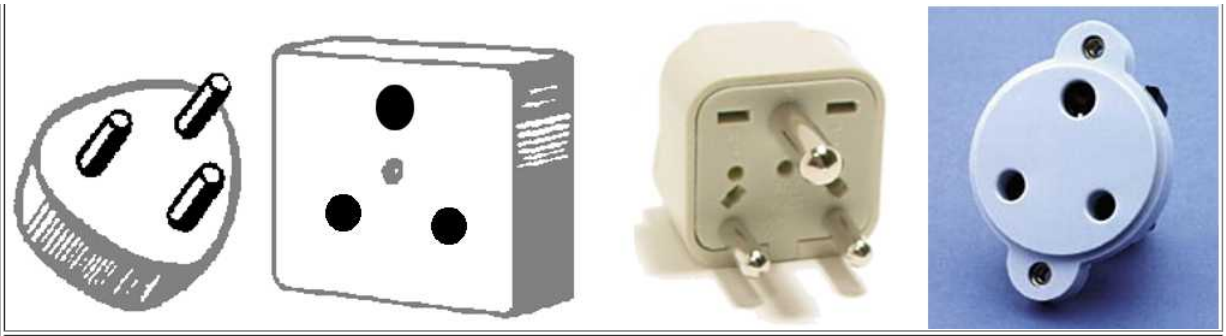
(used in all countries of Europe except the United Kingdom, Ireland, Cyprus and Malta) (Click here for a complete list of all countries that use type C)

This two-wire plug is ungrounded and has two round prongs. It is popularly known as the europlug which is described in CEE 7/16. This is probably the single most widely used international plug. It will mate with any socket that accepts 4.0 - 4.8 mm round contacts on 19 mm centres. The plug is generally limited for use in class II applications that require 2.5 amps or less. It is, of course, unpolarised. It is commonly used in all countries of Europe except the United Kingdom and Ireland. It is also used in various parts of the developing world. Whereas type C plugs are very commonly used, this is not the case for type C sockets. This kind of socket is the older and ungrounded variant of socket types E, F, J, K and N. Nowadays most countries demand grounded sockets to be installed in new buildings. Since type C sockets are ungrounded, they have become illegal almost everywhere and they are being replaced by type E, F, J, K or N (depending on the country). So as to leave no doubt: **only** the sockets have become illegal, the plugs remain in use of course. A type C plug fits perfectly into a type E, F, J, K or N socket.

TYPE D

(used almost exclusively in India, Sri Lanka, Nepal and Namibia) (Click here for a complete list of all countries that use type D)



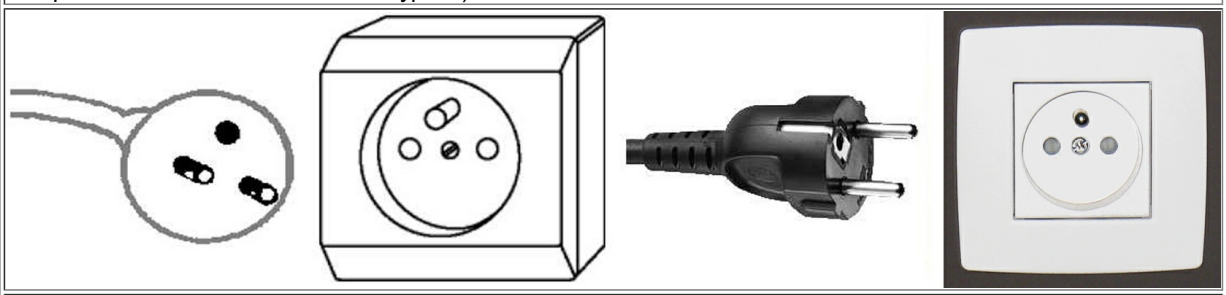
India has standardised on a plug which was originally defined in British Standard 546 (the standard in Great Britain before 1962). This plug has three large round pins in a triangular pattern. It is rated at 5 amps. Type M, which has larger pins and is rated at 15 amps, is used alongside type D for larger appliances in India, Sri Lanka, Nepal and Namibia. Some sockets can take both type M and type D plugs.

Although type D is now almost exclusively used in India, Sri Lanka, Nepal and Namibia, it can still occasionally be found in hotels and theatres in the UK and Ireland. It should be noted that tourists should not attempt to connect anything to a BS546 round-pin outlet found in the UK or Ireland as it is likely to be on a circuit that has a special purpose: e.g. for providing direct current (DC) or for plugging in lamps that are controlled by a light switch or a dimmer.

Type D plugs are among the most dangerous ones in the world: the prongs are not insulated (i.e. the pins don't have a black covering towards the plug body like type C, G, I, L or N plugs), which means that if a type D plug is pulled halfway out, its prongs are still connected to the socket! Little children run the risk of electrocuting themselves when pulling such a plug out and putting their fingers around it.

TYPE E

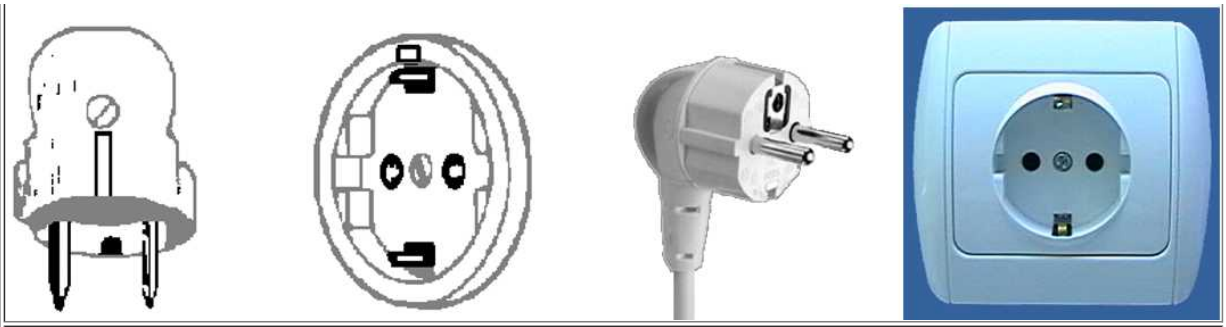
(primarily used in France, Belgium, Poland, Slovakia, the Czech Republic, Tunisia and Morocco) (Click here for a complete list of all countries that use type E)



France, Belgium and some other countries have standardised on a socket which is different from the CEE 7/4 socket (type F) that is standard in Germany and other continental European countries. The reason for incompatibility is that grounding in the E socket is accomplished with a round male pin permanently mounted in the socket. The plug itself is similar to C except that it is round and has the addition of a female contact to accept the grounding pin in the socket. It has two 4.8 mm round contacts on 19 mm centres. In order to bridge the differences between sockets E and F, the CEE 7/7 plug was developed (see photo above): it has grounding clips on both sides to mate with the type F socket and a female contact to accept the grounding pin of the type E socket. The original type E plug, which does not have grounding clips, is no longer used, although very rarely it can still be found on some older appliances. Note that the CEE 7/7 plug is polarised when used with a type E outlet. The plug is rated at 16 amps. Above that, equipment must either be wired permanently to the mains or connected via another higher power connector such as the IEC 309 system. A type C plug fits perfectly into a type E socket.

TYPE F

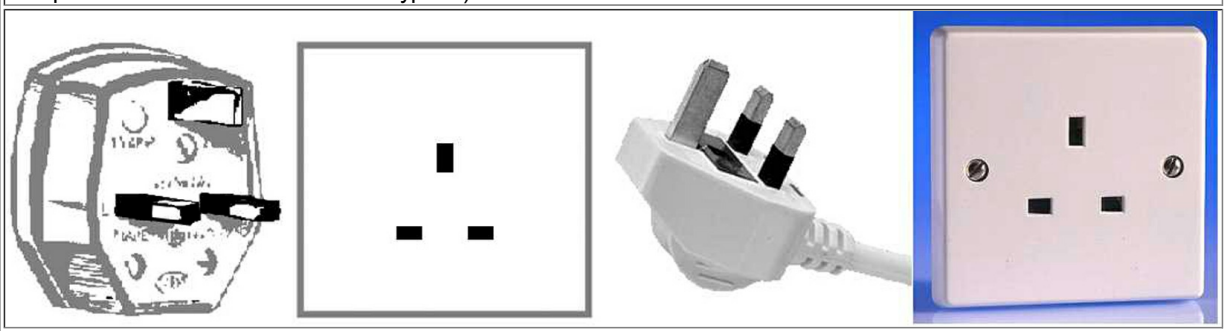
(used in, among others, Germany, Austria, the Netherlands, Sweden, Norway, Finland, Portugal, Spain and Eastern Europe) (Click here for a complete list of all countries that use type F)



Plug F, known as CEE 7/4 and commonly called "Schuko plug", which is the acronym of "**Schutzko**ntakt", a German word meaning "earthed/grounded contact". The plug was designed in Germany shortly after the First World War. It is similar to C except that it is round and has the addition of two grounding clips on the side of the plug. It has two 4.8 mm round contacts on 19 mm centres. Because the CEE 7/4 plug can be inserted in either direction into the receptacle, the Schuko connection system is unpolarised (i.e. line and neutral are connected at random). It is used in applications up to 16 amps. Above that, equipment must either be wired permanently to the mains or connected via another higher power connector such as the IEC 309 system. In order to bridge the differences between sockets E and F, the CEE 7/7 plug was developed (see photo above). This plug, which is shown above, has grounding clips on both sides to mate with the type F socket and a female contact to accept the grounding pin of the type E socket. The original type F plug, which does not have this female contact, is still available at the DIY shops but only in a rewireable version. A type C plug fits perfectly into a type F socket.

TYPE G

(mainly used in the United Kingdom, Ireland, Cyprus, Malta, Malaysia, Singapore and Hong Kong) (Click here for a complete list of all countries that use type G)



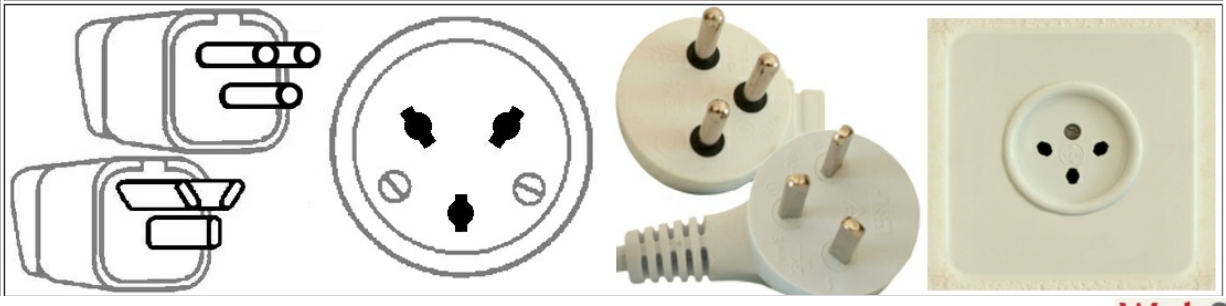
This plug has three rectangular prongs that form a triangle. British Standard BS 1363 requires use of a three-wire grounded and fused plug for all connections to the power mains (including class II, two-wire appliances). British power outlets incorporate shutters on line and neutral contacts to prevent someone from pushing a foreign object into the socket.

The British domestic electrical system uses a ring circuit in the building which is rated for 30 amps (5 amps for lighting circuits which are usually spurs). Moreover, there is also a fusing in the plug; a cartridge fuse, usually of 3 amps for small appliances like radios etc. and 13 amps for heavy duty appliances such as heaters. Almost everywhere else in the world a spur main system is used. In this system each wall socket, or group of sockets, has a fuse at the main switchboard whereas the plug has none. So if you take some foreign appliance to the UK, you can use an adaptor, but technically it must incorporate the correct value fuse. Most would have a 13 amps one, too big for the computer for example. BS 1363 was published in 1962 and since that time it has gradually replaced the earlier standard plugs and sockets (type D) (BS 546).

British plugs are no doubt the safest in the world, but also the most hulking and cumbersome. That's why people often make fun of them saying that British plugs are mostly bigger than the appliance they're connected to...

TYPE H

(used exclusively in Israel) (Click here for a complete list of all countries with their respective plugs/sockets)

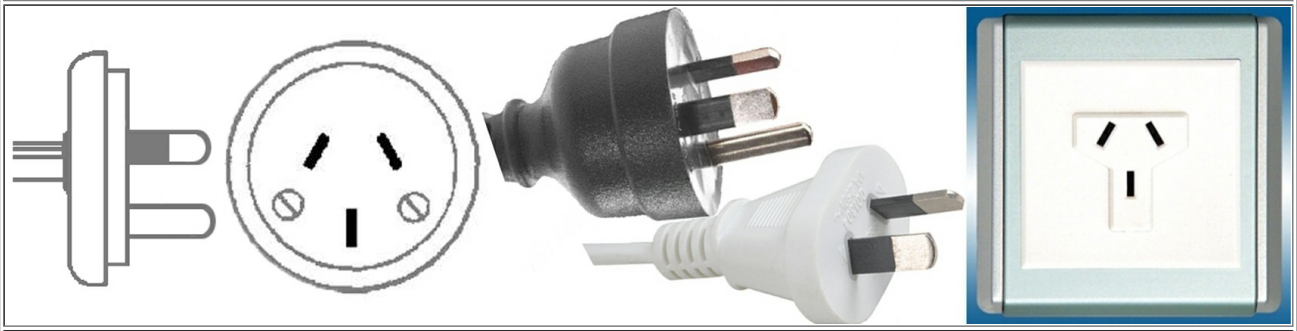


This plug is unique to Israel. It has two flat prongs like the type B plug, but they form a V-shape rather than being parallel. Type H plugs have got a grounding pin as well and are rated at 16 amps. In 1989 Israel standardised on a new version of the type H socket: the holes were made round in order to accommodate type C plugs as well. The slots for the prongs have widenings in the middle specifically to allow type C prongs to fit in. The flat-bladed type H plugs (lower picture) are currently being phased out in favour of round-pinned ones (upper picture). This plug is also used in the West Bank and all of the Gaza Strip.

Type H plugs are among the most dangerous ones in the world: the prongs are not insulated (i.e. the pins don't have a black covering towards the plug body like type C, G, I, L or N plugs), which means that if a type H plug is pulled halfway out, its prongs are still connected to the socket! Little children run the risk of electrocuting themselves when pulling such a plug out and putting their fingers around it.

TYPE I

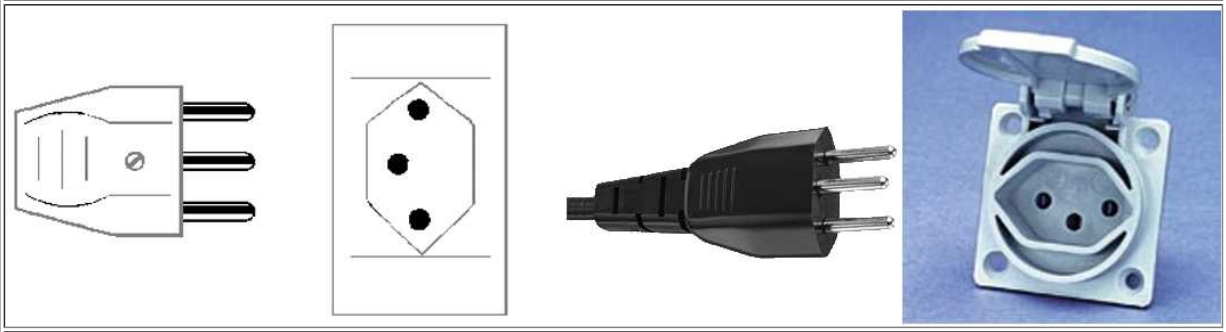
(mainly used in Australia, New Zealand, Papua New Guinea and Argentina) (Click here for a complete list of all countries that use type I)



This plug has also a grounding pin and two flat prongs forming a V-shape. There is an ungrounded version of this plug as well, with only two flat V-shaped prongs. Australia's standard plug/socket system is described in SAA document AS 3112 and is used in applications up to 10 amps. A plug/socket configuration with rating at 15 amps (ground pin is wider: 8 mm instead of 6.35 mm) is also available. A standard 10 amp plug will fit into a 15 amp outlet, but a 15 amp plug only fits this special 15 amp socket. There is also a 20 amp plug whose prongs are wider still. A lower-amperage plug will always fit into a higher-amperage outlet but not vice versa. Although there are slight differences, the Australian plug mates with the socket used in the People's Republic of China (mainland China).

TYPE J

(used almost exclusively in Switzerland and Liechtenstein) (Click here for a complete list of all countries that use type J)



Switzerland has its own standard which is described in SEC 1011. This plug is similar to C, except that it has the addition of a grounding pin. Type J looks very much like the Brazilian type N standard, but it is incompatible with it since type J has the earth pin further away from the centre line than type N (5 mm instead of 3 mm). This connector system is rated for use in applications up to 10 amps. Above 10 amps, equipment must be either wired permanently to the electrical supply system with appropriate branch circuit protection or connected to the mains with an appropriate high power industrial connector. A type C plug fits perfectly into a type J socket.

Type J plugs are among the most dangerous ones in the world: the prongs are not insulated (i.e. the pins don't have a black covering towards the plug body like type C, G, I, L or N plugs), which means that if a type J plug is pulled halfway out, its prongs are still connected to the socket! Little children run the risk of electrocuting themselves when pulling such a plug out and putting their fingers around it.

TYPE K

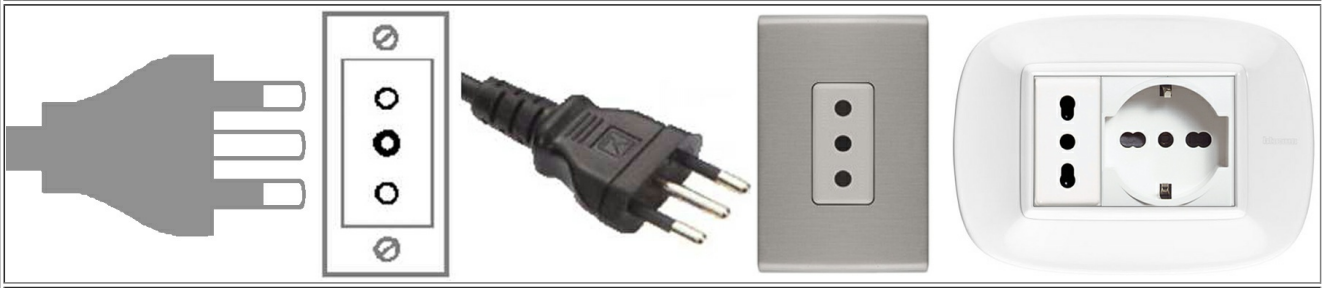
(used almost exclusively in Denmark and Greenland) (Click here for a complete list of all countries with their

respective plugs/sockets)

The Danish standard is described in Afsnit 107-2-D1. The plug is similar to F except that it has a grounding pin instead of grounding clips. A type C plug fits perfectly into a type K socket. The Danish socket will also accept either the CEE 7/4 or CEE 7/7 plugs: however, there is no grounding connection with these plugs because a male ground pin is required on the plug. Because of the huge amount of E/F plugs in Denmark, the Danish government decided to make it legal to install type E instead of type K sockets from 2008 onwards.

TYPE L

(used almost exclusively in Italy and randomly found throughout North Africa) (Click here for a complete list of all countries that use type L)



The Italian grounded plug/socket standard, CEI 23-16/VII, includes two styles rated at 10 and 16 amps. They differ in terms of contact diameter and spacing, and are therefore incompatible with each other or with any other type of plug. The prongs of the 10 amp version are 4 mm thick and 5.5 mm apart, whereas those of the 16 amp version are 5 mm thick and 8 mm apart. The plugs are similar to C, but they are earthed by means of a centre grounding pin and their dimensions are completely different. Since they can be inserted in either direction at random, they are unpolarised. Nowadays there are also "universal" sockets available, of which there are two kinds: the last socket but one on the right is the so-called "bipasso" socket, which accepts L and C plugs, and the last one on the right looks exactly like a type F socket (with grounding clips), but it also has a grounding hole in the middle. This universal "schuko" socket accepts C, E, F and L plugs.

TYPE M

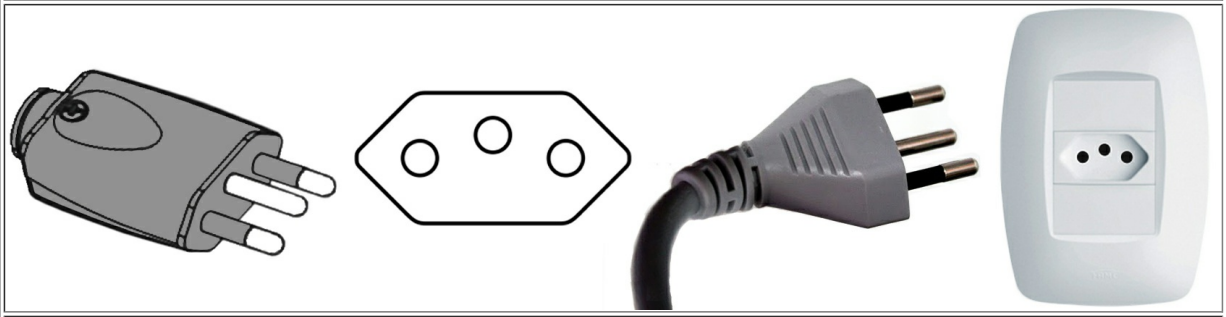
(used almost exclusively in South Africa, Swaziland and Lesotho) (Click here for a complete list of all countries that use type M)

This plug resembles the Indian type D plug, but its pins are much larger. Type M is rated at 15 amps. Although type D is standard in India, Sri Lanka, Nepal and Namibia, type M is also used for larger appliances. Some sockets over there can take both type M and type D plugs. Type M is also used in Israel for heavy appliances such as air-conditioning circuits (in cases where wall-mounted units are plugged in to a dedicated socket) and certain types of washing machines.

Type M plugs are among the most dangerous ones in the world: the prongs are not insulated (i.e. the pins don't have a black covering towards the plug body like type C, G, I, L or N plugs), which means that if a type M plug is pulled halfway out, its prongs are still connected to the socket! Little children run the risk of electrocuting themselves when pulling such a plug out and putting their fingers around it.

TYPE N

(used exclusively in Brazil) (Click here for a complete list of all countries with their respective plugs/sockets)



The above type N socket and plug are the official standard in Brazil. This standard was gradually phased in between 2007 and 2010. Type N looks very much like the Swiss type J standard, but it is incompatible with it since type N has the earth pin closer to the centre line than type J (3 mm instead of 5 mm). Type N consists of two pins and a grounding pin. There are two versions: one is rated at 10 amps and has got a pin diameter of 4 mm. The second version, rated at 20 amps, is used for heavier appliances and has a 4.8 mm pin diameter. Type N sockets were specifically designed to accommodate the ubiquitous type C plugs as well.

Type N is actually based on the international standard 230 V household plug system, called IEC 60906-1. In 1986, the International Electrotechnical Commission published this standard, which was intended to become the common standard for the whole of Europe (and, by extension, all other regions with 230 V mains). Unfortunately, the effort to adopt it as a European Union standard was put on hold in the mid-1990s. Brazil had been using as many as 10 (!) different types of plugs and sockets, including the frequently used type C. In order to put an end to this proliferation of different types of sockets and plugs, the Brazilian Association of Technical Standards (Associação Brasileira de Normas Técnicas (ABNT)) published the standard NBR 14136 in 2001 and started implementing it in 2007. This **N**orma **BR**asileira 14136, however, is not completely identical to IEC 60906-1. The biggest difference is the fact that the Brazilian standard has a pin diameter of 4mm for the 10A plug and 4.8mm for the 20A plug, while the original IEC 60906-1 standard has a single pin diameter of 4.5mm and a maximum current of 16A.

Although type N plug and socket are among the safest in the world, Brazil's standardisation on one single plug and socket does entail some risks. Why? Simply because Brazil is one of the few countries that does not have a standard voltage, but at the same time it has only one official type of socket! In other words, you cannot tell the difference between a 220 V and a 127 V socket! (Click here for an exhaustive list of all 27 Brazilian federative units and their respective voltages.) Most states use 127 V electricity, but a couple of them are on 220 V. This means that a 127 V hairdryer bought in the state of Minas Gerais will be destroyed when plugged into a compatible 220 V socket in Distrito Federal! Make sure you check out the local voltage before plugging something in! (Click here for a trick to know the local voltage.) It must be said, though, that many appliances sold in Brazil are dual voltage, but that's definitely not the case for all of them.

* Argentina has standardised on type I sockets and plugs. Type C plugs and power points are still commonly found in older buildings.

** Brazil has standardised on type N sockets and plugs. Type C plugs (not sockets!) are also legal. Types A, B and I, however, can still commonly be found, but have been declared illegal.

*** Type G plugs and sockets are used in the north as well as the south of Cyprus, whereas type F plugs and receptacles are only found in the north of the island.

**** The official South African socket and plug standard is type M. Nevertheless, appliances with a type C plug are still very commonly found and used with a plug adapter. The older type D plugs may also be found.

Search

What do I need to use my appliances abroad ?

Plug Adapters

They do not convert electricity. They simply allow a dual-voltage appliance, a transformer or a converter from one country to be plugged into the wall outlet of another country. The plug of a Continental European appliance will not fit into an outlet in a foreign country without an adapter.

Converters

Converters and transformers both step up or down the voltage, but there is a difference in use between them. Converters should be used only with "electric" products. Electric products are simple heating devices or have mechanical motors. Examples are hair dryers, steam irons, shavers, toothbrushes or small fans. Converters are not designed for "continuous duty" and should only be used for short periods of time (1 to 2 hours). Additionally, most converters can only be used for ungrounded appliances (2 pins on the plug). Converters must be unplugged from the wall when not in use.

Transformers

Transformers also step up or down the voltage, but they are more expensive than converters and are used with "electronic" products. Electronic products have a chip or circuit. Examples are radios, CD or DVD players, shavers, camcorder battery rechargers, computers, computer printers, fax machines, televisions and answering machines. Transformers can also be used with electric appliances and may be operated continually for many days. The advantage of converters, however, is that they are lighter and less expensive.

Computers are electronic devices and therefore they must be used with a transformer, unless they are dual voltage. Fortunately, most laptop battery chargers and AC adapters are dual voltage, so they can be used with only a plug adapter for the country you will be visiting.

Transformers are sold in various sizes based on how much wattage they can support. Therefore one must pay careful attention to the wattage ratings of the appliances to be plugged into a transformer. The wattage rating of the transformer must always be larger than the wattage rating of the appliance to be plugged into it (plus a 25% buffer to allow for heat build-up in the transformer or converter). When plugging multiple items into a power strip, then into the transformer, you must calculate the combined wattage of all appliances and the power strip, then add an additional 25% to that total.

The appliance's voltage and wattage requirements are listed on the manufacturer's label located on the back or at the bottom of the appliance. In some cases, the voltage and amperage will be listed, but not the wattage. If this is the case, simply multiply the voltage by the amperage rating to find the wattage rating (e.g. 230 V * 1 A = 230 W).

Below is a list that gives an idea what the wattage of common appliances is. Use this as a guide only. Always check your appliance first !

- 75 watts: small, low-wattage appliances such as radios, CD players, heating pads, and some televisions.
- 300 watts: larger radios, stereo consoles, electric blankets, sewing machines, hand mixers, small fans and most TV sets.
- 500 watts: refrigerators, hair dryers, stand mixers, blenders and some stereo equipment.
- 750 watts: projectors, some sewing machines and small electric broom type vacuums.
- 1000 watts: washing machines, small heaters, some coffee makers and vacuums.
- 1600 – 2000 watts: dishwashers, most appliances that have heating elements such as toasters, electric deep-frying pans, irons, and grills.
- 3000 watts: heaters and air conditioners.

Transformers and converters only convert the voltage, not the frequency. The difference in cycles may cause the motor in a 50 Hz appliance to operate slightly faster when used on 60 Hz electricity. This cycle difference will cause electric clocks and timing circuits to keep incorrect time: European alarm clocks will run faster on 60 Hz electricity and American clocks will lose some 10 minutes every hour when used in Europe. However, most modern electronic equipment like battery chargers, computers, printers, stereos, DVD players, etc. are usually not affected by the difference in cycles and adjust themselves accordingly the slower cycles.

Why can only "electric" appliances be used with a converter, and not "electronic" ones ?

The difference between a converter and a transformer lies in how the device converts voltage current. Alternating current power is supplied in alternating bursts that are in a shape called a "sine wave".

To reduce 230 V to 120 V, for example, a convertor delays the start of the sine wave such that the average voltage (actually the root-mean-square) over a full wave is lowered. The high voltage peaks are unfortunately still present and this is what destroys electronic equipment, usually because the resultant voltage is rectified to the full pre-converted value. Appliances such as light bulbs and heaters don't care about those peaks and many motors also are tolerant of them.

A transformer, on the other hand, alters the amplitude of the waves. This is a critical difference because electronic devices cannot cope with high voltage peaks which are still present when lowering voltage by means of a convertor.

The converter's delaying of sine waves is a relatively simple and compact function. The transformer's alteration of sine waves is a relatively sophisticated function and requires more space. As a result, transformers are generally larger, heavier and much more expensive than converters.

Trick to know the local voltage

In case you forget to check what the local voltage is in the country you're going to: here's a small trick. Just take a look at the glass of an ordinary light bulb or stop at a supermarket and note what is printed on a light bulb packet !

Three-phase voltage, frequency and number of wires

Although single-phase power is more prevalent today, three phase is still chosen as the power of choice for many different types of applications. Generators at power stations supply three-phase electricity. This is a way of supplying three times as much electricity along three wires as can be supplied through two, without having to increase the thickness of the wires. It is usually used in industry to drive motors and other devices.

Three-phase electricity is by its very nature a much smoother form of electricity than single-phase or two-phase power. It is this more consistent electrical power that allows machines to run more efficiently and last many years longer than their relative machines running on the other phases. Some applications are able to work with three-phase power in ways that would not work on single phase at all.

Mind you, since three-phase electricity is rarely used for domestic purposes, the table below is only relevant to electricians, electrical engineers and other technically skilled people. Travellers should take a look at the single-phase voltage table. Look-up table (single-phase voltage, frequency and plug/sockets)

COUNTRY	THREE-PHASE VOLTAGE	FREQUENCY	NUMBER OF WIRES (not including the ground wire)
Afghanistan	380 V	50 Hz	4
Albania	400 V	50 Hz	4
Algeria	400 V	50 Hz	4
American Samoa	208 V	60 Hz	3, 4
Andorra	400 V	50 Hz	3, 4
Angola	380 V	50 Hz	4
Antigua	400 V	60 Hz	3, 4
Argentina	380 V	50 Hz	3, 4
Armenia	380 V	50 Hz	4
Aruba	220 V	60 Hz	3, 4
Australia	400 V	50 Hz	3, 4

Austria	400 V	50 Hz	3, 4
Azerbaijan	380 V	50 Hz	4
Azores	400 V	50 Hz	3, 4
Bahamas	208 V	60 Hz	3, 4
Bahrain	400 V	50 Hz	3, 4
Balearic Islands	400 V	50 Hz	3, 4
Bangladesh	380 V	50 Hz	3, 4
Barbados	200 V	50 Hz	3, 4
Belarus	380 V	50 Hz	4
Belgium	400 V	50 Hz	3, 4
Belize	190 V / 380 V	60 Hz	3, 4
Benin	380 V	50 Hz	4
Bermuda	208 V	60 Hz	3, 4
Bhutan	400 V	50 Hz	4
Bolivia	400 V	50 Hz	4
Bosnia & Herzegovina	400 V	50 Hz	4
Botswana	400 V	50 Hz	4
Brazil	220 V / 380 V*	60 Hz	3, 4
Brunei	415 V	50 Hz	4
Bulgaria	400 V	50 Hz	4
Burkina Faso	380 V	50 Hz	4
Burundi	380 V	50 Hz	4
Cambodia	400 V	50 Hz	4
Cameroon	380 V	50 Hz	4
Canada	120/208 V / 240 V / 480 V / 347/600 V	60 Hz	3, 4
Canary Islands	400 V	50 Hz	3, 4
Cape Verde	400 V	50 Hz	3, 4
Cayman Islands	208 V	60 Hz	3
Central African Republic	380 V	50 Hz	4
Chad	380 V	50 Hz	4
Channel Islands (Guernsey & Jersey)	400 V	50 Hz	4
Chile	380 V	50 Hz	3, 4
China, People's Republic of	380 V	50 Hz	3, 4
Colombia	440 V	60 Hz	3, 4
Comoros	380 V	50 Hz	4
Congo, People's Rep. of	400 V	50 Hz	3, 4
Congo, Dem. Rep. of *(formerly Zaire)*	380 V	50 Hz	3, 4
Cook Islands	415 V	50 Hz	3, 4
Costa Rica	240 V	60 Hz	3, 4
Côte d'Ivoire (Ivory Coast)	380 V	50 Hz	3, 4
Croatia	400 V	50 Hz	4
Cuba	190 V	60 Hz	3
Cyprus	400 V	50 Hz	4
Czech Republic	400 V	50 Hz	3, 4
Denmark	400 V	50 Hz	3, 4
Djibouti	380 V	50 Hz	4
Dominica	400 V	50 Hz	4
Dominican Republic	120/208 V / 277/480 V	60 Hz	3, 4
Ecuador	208 V	60 Hz	3, 4
Egypt	380 V	50 Hz	3, 4
El Salvador	200 V	60 Hz	3
Equatorial Guinea	[unavailable]	[unavailable]	[unavailable]
Eritrea	400 V	50 Hz	4
Estonia	400 V	50 Hz	4
Ethiopia	380 V	50 Hz	4
Faeroe Islands	400 V	50 Hz	3, 4
Falkland Islands	415 V	50 Hz	4
Fiji	415 V	50 Hz	3, 4

Finland	400 V	50 Hz	3, 4
France	400 V	50 Hz	4
French Guyana	380 V	50 Hz	3, 4
Gabon	380 V	50 Hz	4
Gambia	400 V	50 Hz	4
Gaza	400 V	50 Hz	4
Georgia	380 V	50 Hz	4
Germany	400 V	50 Hz	4
Ghana	400 V	50 Hz	3, 4
Gibraltar	400 V	50 Hz	4
Greece	400 V	50 Hz	4
Greenland	400 V	50 Hz	3, 4
Grenada (Windward Islands)	400 V	50 Hz	4
Guadeloupe	400 V	50 Hz	3, 4
Guam	190 V	60 Hz	3, 4
Guatemala	208 V	60 Hz	3, 4
Guinea	380 V	50 Hz	3, 4
Guinea-Bissau	380 V	50 Hz	3, 4
Guyana	190 V	60 Hz	3, 4
Haiti	190 V	60 Hz	3, 4
Honduras	190 V	60 Hz	3
Hong Kong	380 V	50 Hz	3, 4
Hungary	400 V	50 Hz	3, 4
Iceland	400 V	50 Hz	3, 4
India	400 V	50 Hz	4
Indonesia	400 V	50 Hz	4
Iran	400 V	50 Hz	3, 4
Iraq	400 V	50 Hz	4
Ireland (Eire)	400 V	50 Hz	4
Isle of Man	400 V	50 Hz	4
Israel	400 V	50 Hz	4
Italy	400 V	50 Hz	4
Jamaica	190 V	50 Hz	3, 4
Japan	200 V	50 Hz / 60 Hz**	3
Jordan	400 V	50 Hz	3, 4
Kenya	415 V	50 Hz	4
Kazakhstan	380 V	50 Hz	3, 4
Kiribati	[unavailable]	[unavailable]	[unavailable]
Korea, South	380 V	60 Hz	4
Kuwait	415 V	50 Hz	4
Kyrgyzstan	380 V	50 Hz	3, 4
Laos	400 V	50 Hz	4
Latvia	400 V	50 Hz	4
Lebanon	400 V	50 Hz	4
Lesotho	380 V	50 Hz	4
Liberia	208 V	60 Hz	3, 4
Libya	220 V / 400 V	50 Hz	4
Liechtenstein	400 V	50 Hz	4
Lithuania	400 V	50 Hz	4
Luxembourg	400 V	50 Hz	4
Macau	380 V	50 Hz	3
Macedonia	400 V	50 Hz	4
Madagascar	220 V / 380 V	50 Hz	3, 4
Madeira	400 V	50 Hz	3, 4
Malawi	400 V	50 Hz	3, 4
Malaysia	415 V	50 Hz	4
Maldives	400 V	50 Hz	4
Mali	380 V	50 Hz	3, 4
Malta	400 V	50 Hz	4
Martinique	380 V	50 Hz	3, 4
Mauritania	220 V	50 Hz	3

Mauritius	400 V	50 Hz	4
Mexico	220 V / 480 V	60 Hz	3, 4
Moldova	380 V	50 Hz	4
Monaco	400 V	50 Hz	4
Mongolia	400 V	50 Hz	4
Montenegro	400 V	50 Hz	3, 4
Montserrat (Leeward Islands)	400 V	60 Hz	4
Morocco	380 V	50 Hz	4
Mozambique	380 V	50 Hz	4
Myanmar *(formerly Burma)*	400 V	50 Hz	4
Namibia	380 V	50 Hz	4
Nauru	415 V	50 Hz	4
Nepal	400 V	50 Hz	4
Netherlands	400 V	50 Hz	3
Netherlands Antilles	220 V / 380 V	50 Hz	3, 4
New Caledonia	380 V	50 Hz	3, 4
New Zealand	400 V	50 Hz	3, 4
Nicaragua	208 V	60 Hz	3, 4
Niger	380 V	50 Hz	4
Nigeria	400 V	50 Hz	4
Norway	230 V / 400 V	50 Hz	3, 4
Oman	415 V	50 Hz	4
Pakistan	400 V	50 Hz	3
Palau	208 V	60 Hz	3
Panama	240 V	60 Hz	3
Papua New Guinea	415 V	50 Hz	4
Paraguay	380 V	50 Hz	4
Peru	220 V	60 Hz	3
Philippines	380 V	60 Hz	3
Poland	400 V	50 Hz	4
Portugal	400 V	50 Hz	3, 4
Puerto Rico	208 V	60 Hz	3, 4
Qatar	415 V	50 Hz	3, 4
Réunion Island	400 V	50 Hz	4
Romania	400 V	50 Hz	4
Russian Federation	400 V	50 Hz	4
Rwanda	400 V	50 Hz	4
St. Kitts and Nevis (Leeward Islands)	400 V	60 Hz	4
St. Lucia (Windward Islands)	400 V	50 Hz	4
St. Vincent (Windward Islands)	400 V	50 Hz	4
San Marino	400 V	50 Hz	4
Saudi Arabia	220 V / 380 V***	60 Hz***	4
Senegal	400 V	50 Hz	3, 4
Serbia	400 V	50 Hz	3, 4
Seychelles	240 V	50 Hz	3
Sierra Leone	400 V	50 Hz	4
Singapore	400 V	50 Hz	4
Slovakia	400 V	50 Hz	4
Slovenia	400 V	50 Hz	3, 4
Somalia	380 V	50 Hz	3, 4
South Africa	400 V	50 Hz	3, 4
Spain	400 V	50 Hz	3, 4
Sri Lanka	400 V	50 Hz	4
Sudan	400 V	50 Hz	4
Suriname	220 V	60 Hz	3, 4
Swaziland	400 V	50 Hz	4
Sweden	400 V	50 Hz	3, 4
Switzerland	400 V	50 Hz	3, 4

Syria	380 V	50 Hz	3
Tahiti	380 V	50 Hz / 60 Hz ****	3, 4
Tajikistan	380 V	50 Hz	3
Taiwan	220 V	60 Hz	4
Tanzania	400 V	50 Hz	3, 4
Thailand	380 V	50 Hz	3, 4
Togo	380 V	50 Hz	4
Tonga	415 V	50 Hz	3, 4
Trinidad & Tobago	200 V	60 Hz	3, 4
Tunisia	400 V	50 Hz	4
Turkey	400 V	50 Hz	3, 4
Turkmenistan	380 V	50 Hz	3
Uganda	415 V	50 Hz	4
Ukraine	380 V	50 Hz	4
United Arab Emirates	415 V	50 Hz	3, 4
United Kingdom	400 V	50 Hz	4
United States of America	120/208 V / 277/480 V/ 120/240 V / 240 V / 480 V	60 Hz	3, 4
Uruguay	220 V	50 Hz	3
Uzbekistan	380 V	50 Hz	4
Venezuela	240 V	60 Hz	3, 4
Vietnam	380 V	50 Hz	4
Virgin Islands	190 V	60 Hz	3, 4
Western Samoa	400 V	50 Hz	3
Yemen, Rep. of	400 V	50 Hz	4
Zambia	400 V	50 Hz	4
Zimbabwe	415 V	50 Hz	3, 4

* In Brazil there is no standard voltage. Click here for an exhaustive list of all 27 Brazilian federative units and their respective three-phase voltages.

** Although the mains voltage in Japan is the same everywhere, the frequency differs from region to region. Eastern Japan uses predominantly 50 Hz (Tokyo, Kawasaki, Sapporo, Yokohama, Sendai), whereas Western Japan prefers 60 Hz (Osaka, Kyoto, Nagoya, Hiroshima).

*** In most parts of Saudi Arabia - such as the Dammam and al-Khobar area - 220 V three-phase electricity is used (127 V single-phase). 220 V (single-phase) and 380 V (three-phase) can be found as well.

**** In Tahiti the frequency is 60 Hz, except for the Marquesas archipelago where it is 50 Hz.

(last update: 18 April 2011)

BACK TO MAIN PAGE