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Power and Data White Paper

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Topic: Powering equipment internationally.

Whether traveling for business abroad, selling electrical devices into foreign markets or installing equipment in a data center internationally - you will quickly run into several issues. Voltage, receptacle type, approvals, hertz, current stability, and even cords are different. Let's make sense of it.

1) Voltage

The United States and much of the Americas standard service is 110-125 volts (v). Most of the world uses 220-240 volts. Japan is the exception operating at 100 volts. This federal government document shows voltages around the world [International Trade Administration's Electric Current Abroad Guide](#).

Volts are significant because equipment has to be compatible with the voltage supplied by the power source or damage will result. You cannot simply plug an 115v device into a 230v receptacle or vice versa without damaging the equipment. The good news is most electronics now ship with universal power supplies that will accommodate all voltages. Verify your equipment power supply range via documentation or by looking at the input/output label on the device. You want to find 100-240v listed to assure it offers universal voltage. <http://www.stayonline.com/reference-ac.aspx>

However, a universal power supply may not be auto-sensing. Many computer power supplies are manually switched. You will find a red slide switch on the exterior surface that typically shows 115v or 230v. It must be slid to show the voltage you are about to plug it into otherwise the power supply will be damaged.

If you don't have a universal power supply the only way to adjust the voltage is with a step up/down transformer <http://www.stayonline.com/power-transformers-two-way.aspx>. These transformers are very heavy at higher wattages. The device you are plugging into the transformer can't exceed the capacity of the transformer or damage will occur. Do not attempt to use a cheap voltage converter designed for bathroom appliances to convert equipment with electronics.

2) Receptacle Types

Colonialism and Regionalism within a nation has created havoc with receptacles. Those in control pressed their receptacle types upon countries in their sphere of influence. Even within a country you

may find several receptacle types used <http://www.stayonline.com/reference-iec-plugs-receptacles.aspx>.

There are 12 main types used throughout the world <http://www.stayonline.com/reference-plug-categories.aspx>. These types may have different dimensions, pin diameters, amperage ratings, and insulation requirements depending upon the country <http://www.stayonline.com/reference-international-plugs.aspx>.

There are three ways to introduce equipment into a receptacle (presuming the voltage is appropriate), a new plug terminated to the existing cord, a plug adapter, or a new cord. These links provide solutions for all three ways of connecting equipment:

- a) <http://www.stayonline.com/searchresult.aspx?categoryid=2390>
- b) <http://www.stayonline.com/power-ac-power-plugs.aspx>
- c) <http://www.stayonline.com/power-international-power-cords.aspx>

3) Approval

The governing bodies for electrical standards within a country have established approvals which may appear on equipment. Approvals are usually only necessary for companies exporting large amounts of equipment to a given country for purpose of resale <http://www.stayonline.com/reference-certification-marks.aspx> and <http://www.stayonline.com/reference-ce.aspx>.

Normally business travelers' devices, Information Technology Equipment for collocation and equipment sent internationally for use within a company branch do not require a country specific approval.

An approval that is vital is Rohs which concerns the materials used in production of a product <http://www.stayonline.com/reference-rohs.aspx>. All product exported to the European Union (EU) must comply with this directive.

4) Hertz (Hz)

Hertz reflects cycles and in the United States we use 60Hz whereas most of the world operates at 50Hz. Hertz primarily only effect motorized devices and not electronics. Many power supplies have universal ratings of 50/60Hz. Transformers can't convert Hertz.

5) Current Stability

Power in the United States can be dirty which is why surge protection is used. The power grids abroad are typically much worse. At a minimum install surge protection <http://www.stayonline.com/international-surge-protection.aspx> . For permanently installed devices a UPS or voltage regulator is more appropriate <http://www.stayonline.com/searchresult.aspx?categoryid=2176>.

6) Cords

An obvious difference is the use of the metric system internationally so here is a conversion table <http://www.stayonline.com/reference-metric-conversion-table.aspx>. Also, the international cord jacket is very different from our common SJT, SVT, STO, and SOOW types <http://www.stayonline.com/reference-international-cord-types.aspx>. This table compares Harmonized amperage ratings against the gauge (AWG) amperage ratings <http://www.stayonline.com/reference-conductor-size-ratings.aspx>. Additionally, the internal wiring color code is different <http://www.stayonline.com/reference-conductor-color-chart.aspx>. Similar to approvals, the cord used will likely not come under scrutiny unless it is being exported for resale.

There are many differences between international power and United States power. Remember voltage is critical and you have to be able to physically plug your equipment into the country's receptacle. Beyond this most differences are only significant to manufacturers exporting product to a country where they will need to comply with the national approvals.

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