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:

North American standard service is 110-125 volts (V). Most of the world uses 220-240V. Japan is the exception operating at 100V. This reference chart lists voltages for each country.
View reference chart: https://www.stayonline.com/product-resources/reference-plug-categories.asp.

Volts are significant because equipment must be compatible with the voltage supplied by the power source or damage will result. You can't 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.

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.

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 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. There are 14 main types used throughout the world and these types may have different dimensions, pin diameters, amperage ratings, and insulation requirements depending upon the country.

View reference chart: https://www.stayonline.com/product-resources/reference-plug-categories.asp.

View reference chart: https://www.stayonline.com/product-resources/reference-international-plugs.asp.

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) https://www.stayonline.com/product-resources/reference-international-plugs.asp
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.

View reference chart: https://www.stayonline.com/product-resources/reference-international-plugs.asp.

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 Restriction of Hazardous Substances (RoHS) which limits the materials used in production of a product. All product exported to the European Union (EU) must comply with this directive.

④ Hertz:

Hertz primarily only effects motorized devices and not electronics. Many power supplies have universal ratings of 50/60Hz. Transformers can't convert Hertz.
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⑤ Current Stability:

Even in North America power can be dirty, which is why surge protection is used. The power grids abroad are typically much worse so at a minimum you should install surge protection. For permanently installed devices a UPS or voltage regulator is more appropriate.

⑥ Cords:

An obvious difference is the use of the metric system internationally. Also, the international cord jacket is very different from our common SJT, SVT, STO, and SOOW types.
View reference chart: http://www.stayonline.com/reference-international-cord-types.aspx

This table compares Harmonized amperage ratings against North American gauge (AWG) amperage ratings.
View reference chart: https://www.stayonline.com/product-resources/reference-conductor-size-comparison.asp

Additionally, the internal wiring color code is different.
View reference chart: http://www.stayonline.com/reference-conductor-color-chart.aspx

There are many differences between international power and North American 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.