REVIEW

Watts Up? Pro

KWH Meter

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Application: We used the Watt's Up? Pro to evaluate the energy use and electrical characteristics of several 120 VAC appliances.

System: Both the Watts Up? Pro and the appliances measured were powered by the grid and then by a sine wave inverter.

Watt-hour meters are necessary tools for anyone interested in analyzing electrical energy consumption. The energy consumed by a variably cycling load, such as a washing machine, is often difficult to predict based solely on run-time. A watt-hour meter can increase accuracy for renewable energy system load analysis.

Most watt-hour meters can tell you the instantaneous power (watts) and the total energy used (watt-hours or kilowatt-hours) by an appliance. But what do you do when you want to see exactly when the energy is being used, and not just the total?

The Watts Up? Pro meter lets you do this with datalogging capabilities and an easy-to-use computer interface. This meter also includes a software calculator that determines the estimated payback period for upgrading to new energy-efficient appliances.

The Watts Up? Pro meter can measure the electrical characteristics and energy consumption of any 120 VAC load up to 15 amps continuous.

Programming & Software Installation

With its small LCD display, this unit can be used right out of the box as a stand-alone meter. But the computer interface really makes it stand out from most other watt- hour meters. Getting started is easy since no programming is necessary for the metering function. To reset the meter and start a new logging session, just push the "select" button. With some programming, the meter can also continuously output data to a PC as a serial data stream. Details are listed in the software's help files.

One nice feature is that the user does not have to worry about the meter running out of memory. It automatically updates the interval at which data is stored, depending on how long the meter is in use. The meter initially records data into the meter's memory every second. This data storage interval increases automatically as the internal memory starts to fill (the meter has up to 1,023 memory locations). The meter automatically doubles the storage interval (2 seconds, 4 seconds, 8 seconds, etc.), and it drops every other sample of data to make room for more. This doubling of the storage interval is done as many times as needed.

The literature provided with the meter was straightforward and easy to follow. The manual clearly explained the different operational modes (watts, watt-hours, time, cost, volts, and amps) and what displays can be selected within each mode. The on-line help is actually useful! The software installation on a PC went smoothly, with no hitches in the setup wizard.

Using the Meter

The Watts Up? Pro is used in the same way as other watt-hour meters. You simply plug the appliance you want to monitor into the meter and plug the meter into an AC electrical outlet. The Watts Up? Pro will only measure 120 VAC appliances, and the maximum current that can be passed through the meter is 15 amps continuous.

Downloading and graphing the data from the Watts Up Pro meter is also easy. The meter can be unplugged from the outlet and appliance and be moved without losing data because the data is saved in nonvolatile memory. To download the data, the meter needs to be plugged back into an outlet and then connected to a serial port (RS232) with the meter's serial port cable. An RS232 to USB adapter is available.

The software walks a first-time user through the entire data collection and downloading procedure in easy-to- follow steps. Experienced users can skip these steps by pressing the "one-step logging" button on the computer screen. The meter has no real-time clock, so you need to set a new time and date for either the first or last sample. The meter then automatically time stamps all the individual data points.

The graph generated by the Watts Up? Pro software for a load of laundry is shown on the next page. The data can also be displayed in a table format by clicking on a tab in the software, and can be exported in a comma-delimited format for further analysis in most common spreadsheet programs. In our test, a load of laundry in our large washer, including a prewash cycle, consumed 187.4 WH of electrical energy.

The toolbar to the left of the on-screen graph makes it simple to customize the graph. Users can select which electrical parameters they want to display—watts, volts, amps, watt-hours, cost, power factor, and duty cycle. Zoom in and zoom out buttons and arrows allow you to select which part of the graph you want to view. The graph can be displayed in a 3-D format, with user-selectable depth and rotation. Files can be exported in .bmp, .wmf, or .emf file format.

The Watts Up? Pro software also includes an appliance payback calculator. This cool tool gives an estimated monthly savings and payback period for a new appliance compared to the appliance just measured. We tried this feature using a Vestfrost ConServ refrigerator and found that the ConServ was more efficient than any of the preprogrammed refrigerators.
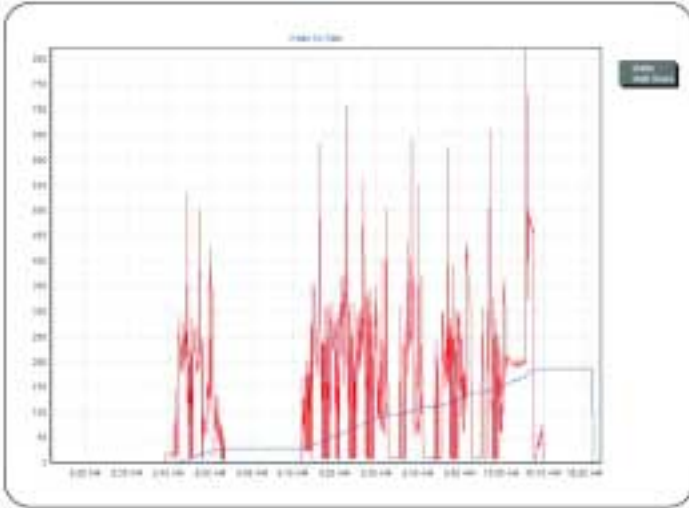
The graph shows the electrical energy used by a Frigidaire Gallery horizontal-axis washing machine for a single load. Note the distinct prewash cycle on the left side of the graph and the spike with the final spin cycle on the right.

The calculator can also be used to compare washers, dryers, or any other appliance you may be thinking about upgrading. This is a useful tool for people thinking about buying new energy-efficient appliances, or anyone who specifies appliance upgrades. The software includes 71 refrigerators, 25 washers, and 9 dryers. You can manually add appliances not included in the preprogrammed menu, such as ultra-efficient appliances or new models released after the meter software was released. The meter allows you to enter the average energy the appliance uses (KWH per month) and the appliance price. The meter calculates the payback period of purchasing a new appliance by using this information, the cost of your electricity, and the average energy consumed by the appliance as measured by the meter.

The Watts Up? Pro meter came nicely packaged in a sturdy cardboard box that can be used to neatly store the meter and cords when not in use. The meter comes with a 6 foot (1.8 m) electrical cord, software on a CD, an RS232 interface cable, and two manuals—one for getting started and a user's guide. The software is compatible with Windows 95 and above (98, 2000, XP).

We like the Watts Up? Pro. The meter and software are easy to use. It measures all electrical characteristics of an appliance needed for a common load analysis. The graphs are easily configurable and can be used to teach principles of load analysis. The payback calculator is a useful tool for anyone wanting to see the economic payback of upgrading to energy efficient appliances.

Access

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Features

High Points:
- User-friendly data acquisition
- Simple software setup
- Payback calculator
- Long cord for ease of use with large appliances
- Clever automatic sampling interval update
- Works with modified square wave inverters
- Measures peak power and power factor

Low Points:
- No Mac OS software
- Need to reset time stamp each time data is downloaded
- No real-time monitoring via PC included in software (can be done with user programming though)

List Price: US$130.95

Warranty: One year

Other:
- UL listed
- Serial (RS232) to USB adapter available

Tech Specs

Measures:
- Power (instantaneous/max/min watts)
- Energy consumed (cumulative and average monthly KWH)
- Power factor
- Elapsed time
- Duty cycle
- Cost (cumulative and average monthly, two-tiered KWH cost)
- Voltage (instantaneous/max/min)
- Amperage (instantaneous/max/min).

Memory Size: 1,023 samples

Sampling Rate:
Approximately 4,000 samples per second maximum

Physical Size:
4 by 7.25 by 2 inches (10 x 18 x 5 cm)

Weight: 1.25 pounds (0.57 kg)

Construction:
Tough plastic case with LCD display