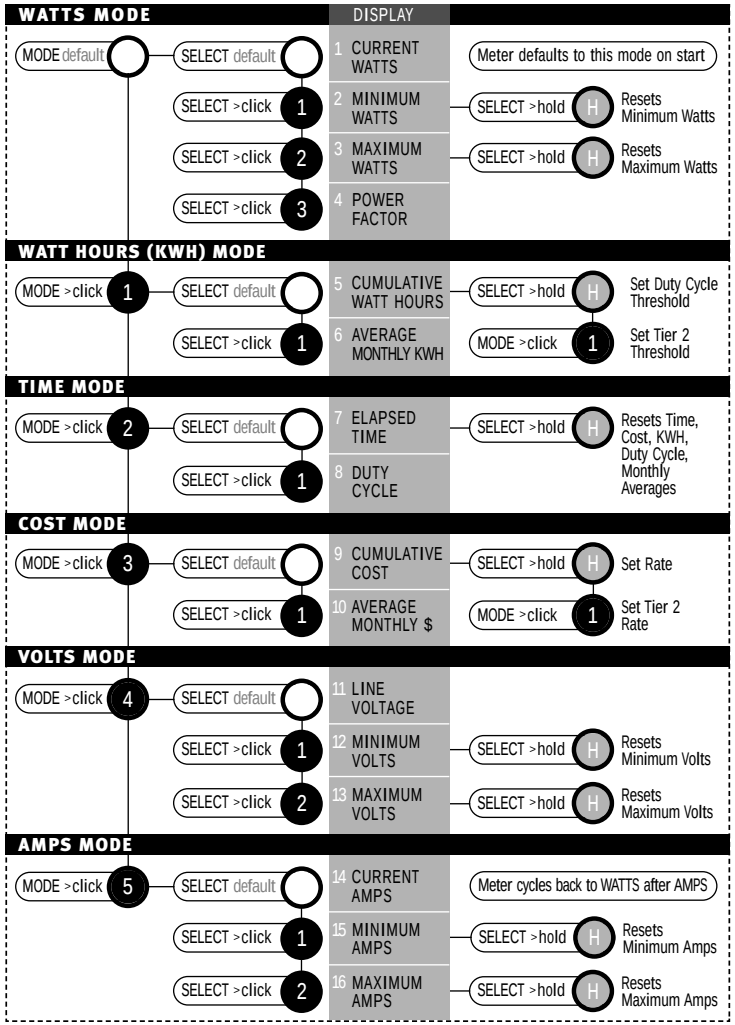
Quick Reference Guide

This quick reference guide lists all the displays. They are numbered 1-16, and are each described in more detail on the preceding pages. Get the most out of your meter by skimming through the entire manual so you understand all the capabilities of Watts up?.



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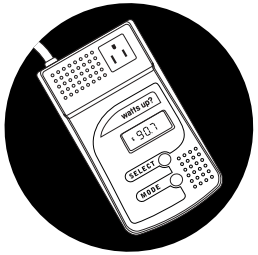


OPERATORS MANUAL

watts up?

POWER ANALYZER, WATT METER AND ELECTRICITY MONITOR

\+ watts up?PRO

Getting Started

1. Plug Watts up? into a standard 120-volt AC wall outlet.

   PRO version only: The meter will flash "RESET? LOG" for approximately ten seconds. a) If you want to delete the stored data in memory, and begin a new logging session (which also resets the sample rate to 1 second), press and hold the SELECT button for 1 second. The "RESET? LOG" symbol stops flashing, and when you release the SELECT button the meter resumes normal operation.

   b) If you want to resume logging, and leave the accumulated data in memory (this does NOT reset the sample rate to 1 second), simply wait for the flashing to stop and the meter will return to normal operation. Clicking either the SELECT or MODE button stops the flashing immediately.

2. Plug an appliance into Watts up?
3. Turn on the appliance.

You'll see a reading like "35.7 WATTS." Watts up? always displays WATTS mode when first plugged in. There are six "modes" on the Watts up? meter. Modes are the major values that the meter displays. The modes are: WATTS, WATT HOURS, TIME, COST, VOLTS, and AMPS. Each mode includes one or more detail readings. For example, when in the WATT mode, you can see detail about watts, such as the MINIMUM WATTS or the MAXIMUM WATTS. The six modes and their detail readings are shown on the quick reference guide. To learn more about each mode, refer to the sections that follow.

4. To cycle through modes, simply click the MODE button. Each time you click the MODE button, you'll cycle to another mode.
5. To cycle through details within a mode, simply click the SELECT button while in that mode.
6. To reset any reading, press and hold the SELECT button for one second.

Clicking the MODE button cycles the display through all 6 modes, always in the same order. If you get confused, simply click the MODE button repeatedly until you get to the WATTS mode. Or simply unplug Watts up? and plug it back in. The display will now be in the WATTS mode. Unplugging Watts up? also resets all the values except RATE and THRESHOLD.

MODES

This section describes each mode and the detail you can see within each mode. The detail readings are accessed by clicking the SELECT button while in the respective mode. If the MODE button is clicked while viewing a detail reading, Watts up? exits the detail reading and displays the next mode. For example, if MAXIMUM WATTS is being viewed and the MODE button is clicked, then the WATT HOUR mode is displayed. There are sixteen displays total, and each is described below. Examples shown represent a 150 watt bulb turned on eight hours per day for two days.

WATTS MODE

Watts up? always turns on in WATTS mode.

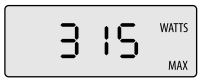
1 CURRENT WATTS

When you turn on Watts up? or cycle to the WATTS mode, true RMS watts (the wattage currently being consumed) are automatically displayed. If nothing is plugged into Watts up?, the display reads zero (0).

2 MINIMUM WATTS

Click the SELECT button while in the WATTS mode. The display now shows the MINIMUM WATTS since Watts up? was plugged in or since the MINIMUM was last reset. This usually reads zero. It is used to determine the lowest wattage drawn for appliances that run continuously.

To reset the value after the appliance is on, press and hold the SELECT button for 1 second.



3 MAXIMUM WATTS

Click the SELECT button again. The display now shows the MAXIMUM WATTS since Watts up? was plugged in or since the MAXIMUM was last reset. This will read zero (or a small value, since there is often a surge when plugging Watts up? in) until an appliance is plugged in and turned on.

To reset the MAXIMUM, press and hold the SELECT button for one second.

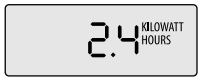
4 POWER FACTOR

Click the SELECT button again. The display now shows power factor for the appliance currently plugged in. POWER FACTOR is a number between zero and one, and it represents the phase angle shift between the voltage and current. To figure POWER FACTOR, Watts up? performs the following calculation: RMS Watts/Apparent Watts.

Click the SELECT button again. The display returns to the WATTS mode.

WATT HOURS MODE

Click the MODE button.



5 CUMULATIVE WATT HOURS

The display now indicates the cumulative WATT HOURS used since Watts up? was plugged in or TIME was last reset. Watt hours equal watts multiplied by time. For instance, a 150 watt bulb plugged in for 1 hour will consume 150 watt hours. In two hours, it will have consumed 300 watt hours. As the value increases, the display will automatically change units to KILOWATT HOURS (1 kilowatt hour (kwh) = 1000 watt hours).

6 AVERAGE MONTHLY KWH

Click the SELECT button while in the WATT HOUR mode. The display now shows how many watt hours will be consumed each month. This is a pro-rated average, calculated since Watts up? was plugged in or TIME was last reset. The formula is:

AVERAGE MONTHLY KWH = (watt hours)/{(# of elapsed days)/(30 days)}.

It is used to determine how much electricity is used per month.

Resetting the TIME will also reset the MONTHLY AVERAGE.

Click the SELECT button again. The display returns to the WATT HOURS mode.

SETTING THRESHOLDS (WATT HOURS MODE)

DUTY CYCLE WATTS THRESHOLD

DUTY CYCLE is the percent of time the appliance is above a threshold level. The default threshold is 100 watts, so the DUTY CYCLE will display the percent of time the appliance is above 100 watts. The threshold can be changed to any number between one and 1500 watts. To change the threshold, go to the WATT HOURS mode. Press and hold the SELECT button until the *SET, DUTY CYCLE, WATTS* symbols come on. *UP/DOWN* indicators will alternately flash. Click the SELECT button and the value will change in the direction of the arrow. Holding the SELECT button changes the value faster. Click the MODE button when the threshold is correct. The TIER 2 THRESHOLD is now displayed.

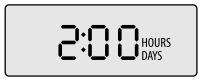
It is recommended that you reset the TIME (see below) after changing the DUTY CYCLE THRESHOLD, because the duty cycle value is a real-time calculation.

TIER 2 KWH THRESHOLD

TIER 2 THRESHOLD is used to calculate secondary utility rates, described below in the COST section. To change the TIER 2 THRESHOLD, go to the DUTY CYCLE THRESHOLD and click the MODE button. The *SET, TIER 2, KILOWATT HOURS* symbols come on. *UP/DOWN* indicators alternately flash. Click the SELECT button and the value changes in the direction of the arrow. Holding the SELECT button changes the value faster. Click the MODE button when the value is correct. The default value is 500 kilowatt hours.

TIME MODE

Click the MODE button again.



7 ELAPSED TIME

The display now indicates the elapsed TIME since Watts up? was plugged in or TIME was last reset. The TIME is first displayed in minutes and seconds (i.e. 1:25 means one minute and 25 seconds), up to 20 minutes. At 20 minutes, the display changes to hours and minutes and the *HOURS* symbol turns on (i.e. 1:25 now means one hour and 25 minutes). At 20 hours, the display changes to days and hours, and the *DAYS* symbol turns on (i.e. 12:17 means 12 days and 17 hours). At 20 days, the display changes to days with a decimal point, and the *HOURS* symbol turns off (i.e. 22.7 means 22 days and 7 tenths. 7 tenths is about 16 hours and 45 minutes).

0:00 – 19:59 (Zero to 19 minutes, 59 seconds)	Display > no symbol
0:20 – 19:59 (20 minutes to 19 hours, 59 minutes)	Display > HOURS
0:20 – 19:23 (20 hours to 19 days, 23 hours)	Display > HOURS and DAYS
20.1 – 1999 (20 1/10 days to 1999 days. After 1999 days, start over at 1 second)	Display > DAYS

Press and hold the SELECT button for one second while in the TIME mode to reset the TIME, WATT HOUR, COST, DUTY CYCLE and MONTHLY AVERAGE values back to zero. These values, as well as MINIMUMS and MAXIMUMS are also reset when Watts up? is unplugged.

8 DUTY CYCLE

Click the SELECT button while in the TIME mode. The display now shows the DUTY CYCLE as a percentage (the number will be between zero and 100). DUTY CYCLE is the percent of time the appliance is above a threshold level. The default threshold is 100 watts, so the DUTY CYCLE will display the percentage of time the load is above 100 watts. The threshold can be changed to any number between one and 1500 watts.

For example, plug a refrigerator into Watts up?. The DUTY CYCLE will be the percent of time that the refrigerator compressor is running (if the threshold is set to more than the wattage of the refrigerator light bulb).

Click the SELECT button again. The display now returns to the TIME mode.

COST MODE

Click the MODE button again.

9 CUMULATIVE COST

The display now indicates the amount of money consumed since Watts up? was plugged in or TIME was last reset. Tenths of a cent are initially displayed, so ".001" means 1/10 of a cent. ".234" means 23 and 4/10s cents. "3.24" means three dollars and 24 cents.

10 AVERAGE MONTHLY COST

Click the SELECT button while in the COST mode. The display now shows the cost per month for whatever is plugged in. This is a pro-rated average, calculated since Watts up? was plugged in or TIME was last reset. The formula is:

AVERAGE MONTHLY $ = (cost) / {(# of elapsed days) / (30 days)}.

This value will change quickly when something is first plugged in. For refrigerators and other appliances that turn on and off, wait until the value no longer changes for an accurate reading. This may take a few hours, or even longer depending on how often the appliance cycles on and off.

Click the SELECT button again. The display now returns to the COST mode.

SETTING RATES (COST MODE)

RATE

The COST is calculated by multiplying the kilowatt-hours by the rate charged by the utility. Most rates range from 3 cents to twenty-five cents per kilowatt-hour, although they can be even higher. Call your utility or look on your utility bill and divide the cost for electricity by the number of kilowatt-hours consumed to determine your local rate. The default rate that Watts up? uses is 8 cents per kilowatt-hour. To change the rate in Watts up?, go to the COST mode. Press and hold the SELECT button until the *SET and RATE* symbols come on. *UP/DOWN* indicators will alternately flash. Click the SELECT button and the value will change in the direction of the arrow. Holding the SELECT button changes the value faster. The rate can be set for any amount between zero and $2.00 per kilowatt-hour, in tenths of a cent increments. Click the MODE button when the rate is correct. The TIER 2 RATE is now displayed.

TIER 2 RATE

The TIER 2 RATE is displayed after the RATE (described above). Some utilities use more than one rate structure. Rates can be different based on the time of day, peak usage, or total usage. Watts up? has the capability to utilize a second rate based on total usage, which is called the TIER 2 RATE. However, because Watts up? only measures one outlet and not the entire house, most users find it unnecessary to use the TIER 2. The default TIER 2 RATE is ten cents per kilowatt-hour, and it can be changed the same way as RATE described above. The TIER 2 RATE is applied when the total usage is more than the TIER 2 THRESHOLD, described above in the WATT HOURS mode section.
The formula is: Total cost = (Rate) * (kilowatt hours below Tier 2 threshold) +
(Tier 2 rate) * (kilowatt hours above Tier 2 threshold)

VOLTS MODE

Click the MODE button again.

11 LINE VOLTS

The display now indicates the LINE VOLTAGE.

12 MINIMUM VOLTS

Click the SELECT button while in the VOLTS mode. The display now shows the MINIMUM VOLTS since Watts up? was plugged in or since the MINIMUM was last reset. This can be a good indication of the line quality serving the outlet.

To reset the value to zero, press and hold the SELECT button for one second.

13 MAXIMUM VOLTS

Click the SELECT button again. The display now shows the MAXIMUM VOLTS since Watts up? was plugged in or since the MAXIMUM was last reset. This value could represent voltage surges, which is when the voltage momentarily increases.

To reset the value to zero, press and hold the SELECT button for one second.

Click the SELECT button again. The display now returns to the VOLTS mode.

AMPS MODE

Click the MODE button again.

14 CURRENT AMPS

The display indicates the AMPS being drawn by the appliance plugged into Watts up?.

15 MINIMUM AMPS

Click the SELECT button while in the AMPS mode. The display now shows the MINIMUM AMPS since Watts up? was plugged in or the MINIMUM was last reset. This will typically read zero. It is used to determine the lowest amperage drawn for appliances that run continuously.

To reset the value after the appliance is turned on, press and hold the SELECT button for one second.

16 MAXIMUM AMPS

Click the SELECT button again. The display now shows the MAXIMUM AMPS since Watts up? was plugged in or the MAXIMUM was last reset. This will read zero (or a small value, since there is often a surge when plugging Watts up? in) until an appliance is plugged in and turned on.

To reset the value to zero, press and hold the SELECT button for one second.

Click the SELECT button again. The display now returns to the AMPS mode.

WATTS UP? PRO

The PRO model stores the 16 values described above into memory, and time stamps the occurrence of any power cycle. The data can then be downloaded to a computer. The data is stored every second until 1023 records are stored. The interval at which the data is stored is called the sample rate. The sample rate starts at a one (1) second interval. The memory holds 1023 records, and each time the memory fills up (17 minutes at one second), every other record is deleted. Then the sample rate doubles, and the logging continues. To reset the sample rate to one second, erase the memory. This can be done when the meter is first plugged in, or from the PC at any time.

Time logged	Sample rate
0 – 17 minutes	1 second
17 – 34 minutes	2 seconds
34 – 68 minutes, etc.	4 seconds

The sample rate continues to double as needed so Watts up? PRO can record indefinitely. If Watts up? PRO is unplugged, or if power is lost, the data in memory is maintained and data will continue to be stored once power is restored.

The PRO model comes with a CD containing a software program that must be installed on a computer, and a download cable that connects to the computer serial port (an adapter serial port to USB is available - contact eed at doubleed.com or 877-928-8701). An extensive help file is available in the program to answer questions. To install the program, simply insert the CD into your computer's CD drive and follow the on-screen directions. If nothing happens, select START, then RUN, and select the file: wusetup.exe The install wizard will then start.

The software includes a "Payback Calculator" which will determine whether it is cost effective to replace an appliance with a new more energy efficient model. For example, after downloading the data, it will calculate the current cost per month of running your refrigerator. You can then select a new model from the drop down list, or type in a new model. Enter the purchase price and the kwh usage per month (which can be found on the yellow Energy Guide label on new refrigerators). The Payback Calculator will then calculate the savings per month and the number of months it will take to pay for the new refrigerator.

About Watts up?

Watts up? incorporates sophisticated digital electronics that enable precise and accurate measurements in an easy-to-use format. State-of-the-art digital microprocessor design utilizes high-frequency sampling of both voltage and current measurements for true power. Power factor is captured so even phase-shifted loads such as motors are accurately measured. Watts up?PRO downloads data to a PC for graphing and charting. Fast, intuitive and easy-to-use, Watts up? quickly and accurately measures any 120 VAC appliance.

FAQ: please see the website for an updated list.

Q: Are non-sine wave loads measured accurately, such as those from solar powered inverters?

A: Yes, Watts up? measures both the current and voltage thousands of times per second so non-sine wave loads are measured accurately.

Sample Consumption and Costs for Typical Appliances

Appliance	Wattage	Daily Cost	Monthly Cost	Annual Cost
Refrigerator	250 watts	$.25	$7.50	$90
Computer	60 watts	$.12	$3.46	$41
100 bulb on 12 hrs/day	100 watts	$.10	$2.88	$35

Sample consumption and costs for typical appliances (using an electricity rate of 8 cents per kilowatt hour)

Technical specifications

- 120 VAC, 60 Hz, 15 amps continuous
- True RMS power measured and displayed
- Accuracy is: +/- 3%, +/- 2 counts of the displayed value for loads above 10 watts
  Accuracy is: +/- 5%, +/- 3 counts of the displayed value for loads below 10 watts
  *Accuracy is of the displayed value, not the range. Some devices claim a smaller number for accuracy but it refers to the range. For instance, a specification of 0.2% of the range sounds good, but it is actually 3.6% of the display (.02 * 1800 = 3.6), which is a worse accuracy.*
- RS232 interface (PRO). A USB to RS232 adapter is available
- Mains supply voltage fluctuations not to exceed +/- 10% of the nominal voltage
- Input is via 6' electric cord, output is via outlet on top of meter

For UL rating

- Indoor use only
- Altitude up to 2000 meters
- Temperature 5.0˚ C to 40.0˚ C
- Installation Category II
- Pollution Degree 2
- Maximum relative humidity 80% for temperatures up to 31.0˚ C decreasing linearly to 50% relative humidity at 40.0˚ C.

Cleaning

Watts up? may be cleaned using a dry soft towel. Do not use liquids to clean. Do not disassemble. There are no spare parts. No preventative maintenance is required. If the case breaks or other physical damage is apparent, do not use.

Warning

Watts up? is not a toy and is only intended for use by people over the age of 10. Never open the case. Shock hazard exists. Watts up? is not water resistant. As with all electronic equipment, avoid water and liquids. Do not touch Watts up? if it is wet. Watts up? is not repairable. If Watts up? is used in a manner not specified herein, the protection provided by Watts up? may be impaired.

Warranty

Watts up? is guaranteed for 12 months from date of purchase. If a problem arises, simply return the meter to the place of purchase, along with proof of purchase, for a new meter or credit. For technical assistance or repair, please call toll free: 877.wattso1 (877.928.8701). Electronic Educational Devices believes it is everyone's responsibility to help the environment. In this effort, e.e.d purposefully uses recycled components wherever possible and minimizes extraneous packaging. We hope that using Watts up? helps people understand the costs involved with electricity, and thereby encourages conservation and participation in environmental issues.