

TED 5000 USER MANUAL



The Energy Detective (**TED**) is an accurate electricity monitor that provides real-time feedback on electricity usage. **TED** will lower utility bills, reduce electric waste, and save the environment. **TED** is the leader in electricity management systems, due to its accuracy, affordability, ease-of-installation, and comprehensive software. Other features include:

- Sensitive to one watt
- Accurate to within 2%
- View data remotely*
- Provides voltage data
- Fits any utility rate structure
- Stores up to 10 years worth of data
- Monitor up to five individual appliances
- Easily export data from Gateway
- Measures production, consumption, and net metering
- No subscription/monthly fees

To View a Live Demo on the TED System visit <http://www.theenergydetective.com/ted-5000/live-demo>

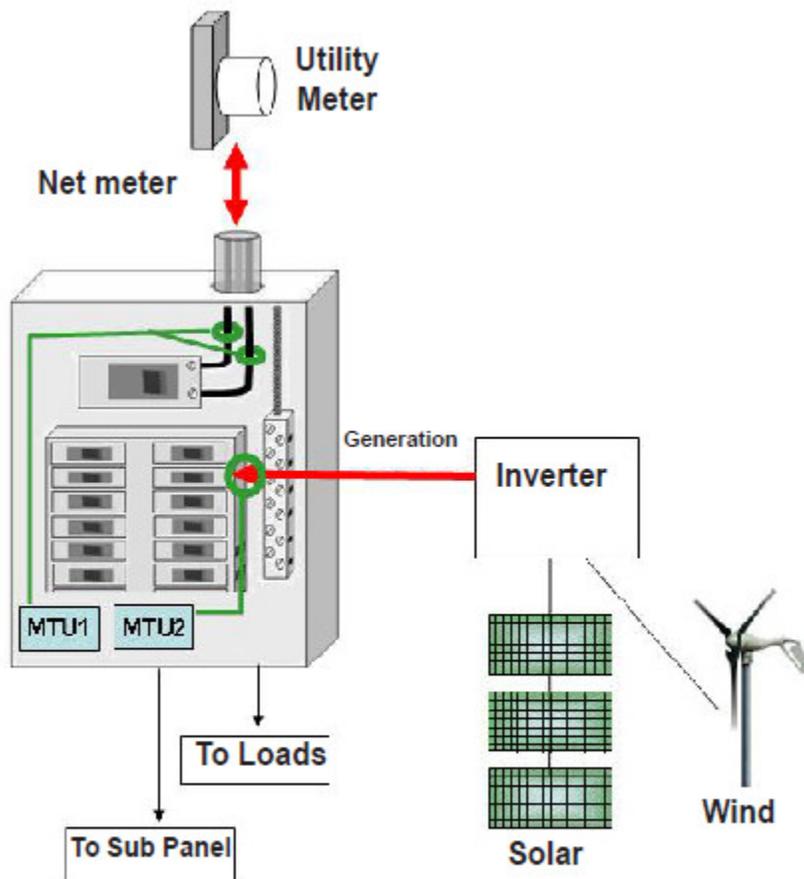
User Guides, Footprints Software, and other support needed for your TED System

TED Trouble Shooting Guides and Videos

Visit <http://www.theenergydetective.com/media/Troubleshooting%20Guide.pdf>

Solar Installation

TED is the perfect solution for measuring and monitoring any alternative energy installation. Once set up, one can easily view production, consumption, *and* net metering. Plus, installing TED is quick and easy.



Typical Solar/Wind/Aux Generator Installation

Install MTU1 on your main feed from the utility.

Install MTU2 on inverter feeds to your main panel.

In System Settings Wizard > System Layout.

Set MTU1 as "Adjusted Load"

Set MTU2 as "Generation"

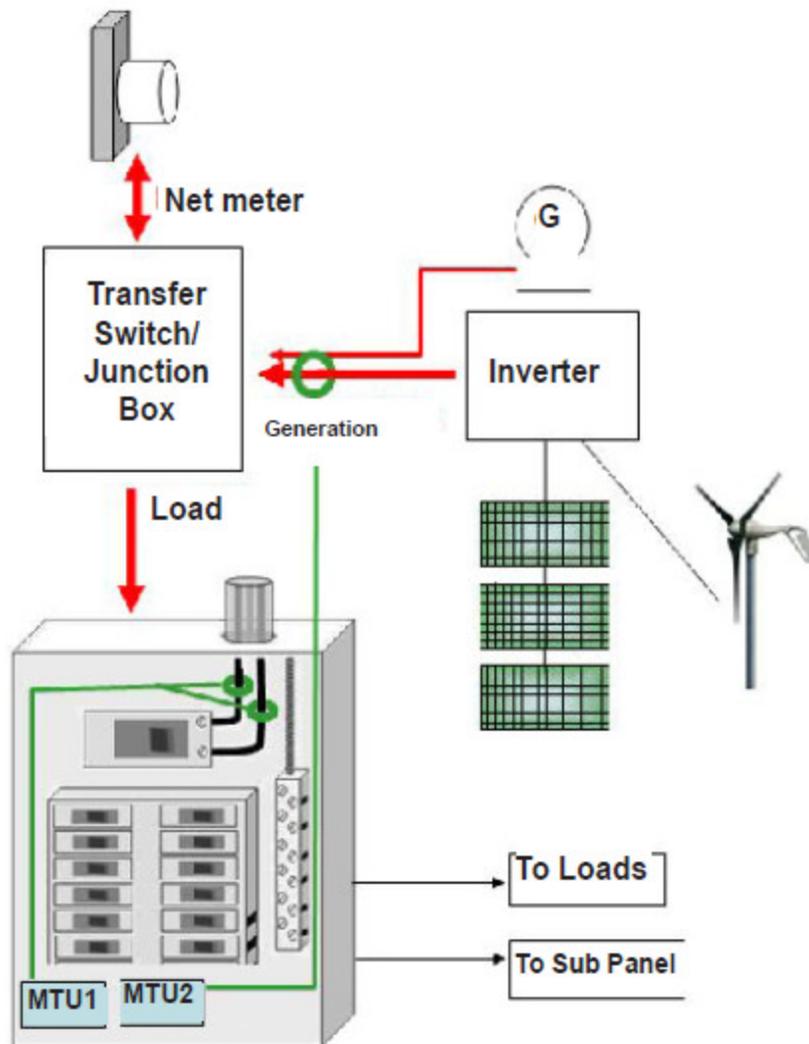
Go to the next to last tab "Footprints Settings" and set your minimum real time KW to whatever your solar system is capable of producing and put a (negative) - sign in front.

So if your solar is pushing up to 5k make your minimum a -5.

This will give you a negative scale on both the realtime dial and the graphing.

Verify that the CT's on the MTU1 are reading positive when you are using power from the grid. Just turn off your solar inverters and make sure that reading is positive. If it's negative, flip both CT's 180degree on the MTU1.

Once your system is setup this way. MTU2 will always be reporting a negative number. When you look at MTU1, what you will see is the "calculated" load of your house. Meaning that it will take into account what the solar is generating in addition to what your pulling from the utility.



Typical Solar/Wind/Aux Generator Installation

Install MTU1 on your main feed from the utility.

Install MTU2 on inverter feeds to junction box.

In System Settings Wizard > System Layout.

Set MTU1 as "Load"

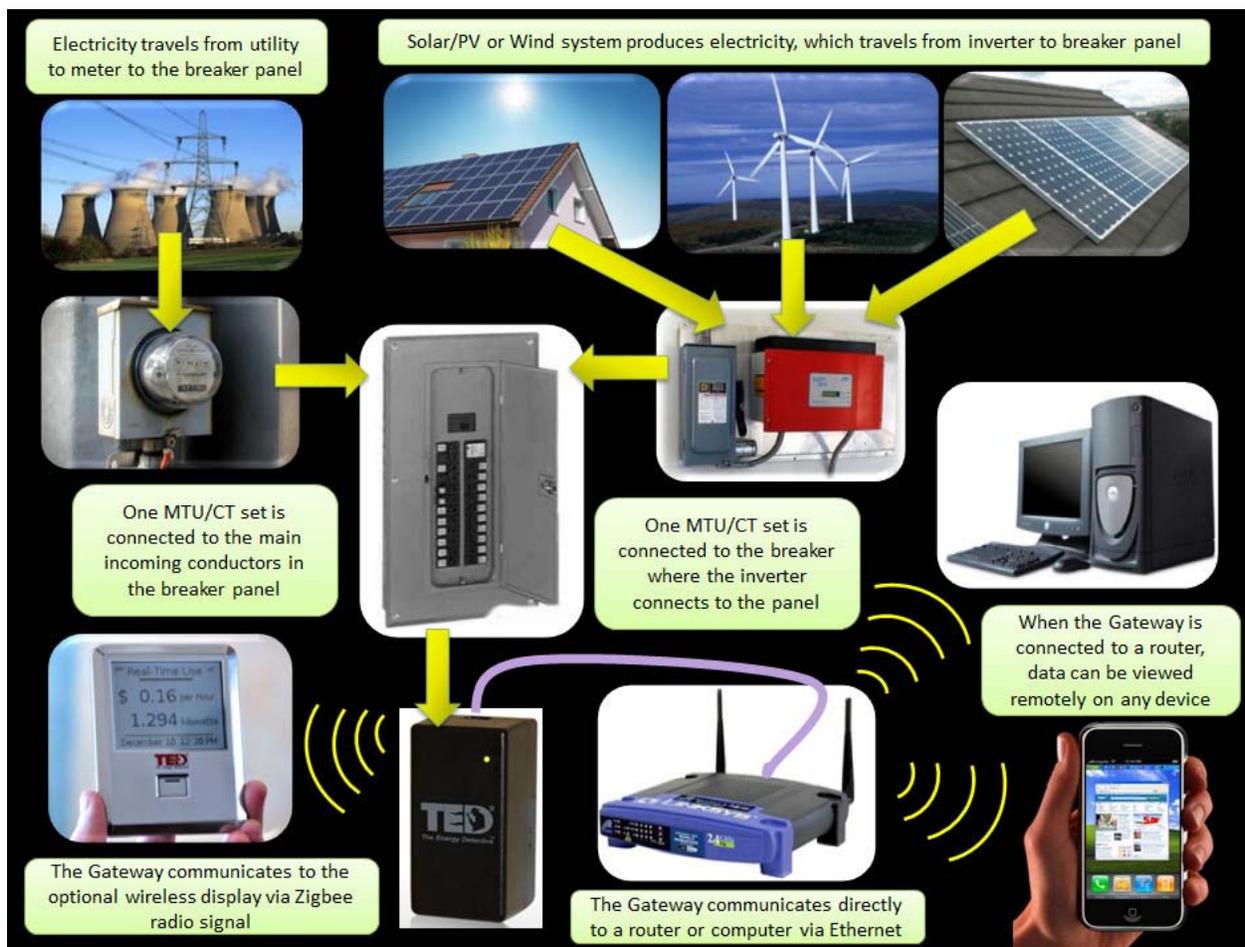
Set MTU2 as "Generation"

Go to the next to last tab "Footprints Settings" and set your minimum real time KW to whatever your solar system is capable of producing and put a (negative) - sign in front.

So if your solar is pushing up to 5k make your minimum a -5.

This will give you a negative scale on both the realtime dial and the graphing.

How TED Works With Solar



Does TED monitor Voltage?

Many people concerned about accuracy ask this question all the time. And rightfully so.

Yes, TED does measure VOLTAGE and POWER FACTOR in its calculations. Measuring these components is critical if you want accurate data. Here is the very fundamental formula for calculating AC POWER:

Power = Voltage x Current x Power Factor

As you can see, there are 3 vital ingredients that must be known to have accurate energy and power data. If you don't measure them all, you will not have accurate data.

Systems that use batteries cannot measure either Voltage or Power Factor and therefore are missing 2 of the 3 vital ingredients in the formula. If voltage and Power Factor are *NOT* measured, it is the equivalent to having a BLT sandwich without the bacon and lettuce....two of the 3 important ingredients are missing.

How does Power Factor and kVA work?

Basic electricity states that: **$P \text{ (kW)} = I \text{ (Amps)} \times V \text{ (Volts)}$** .

However this is only true in DC-circuits. In AC-circuits the correct formulae are: **Apparent Power $S \text{ (kVA)} = I \text{ (Amps)} \times V \text{ (Volts)}$**

Real Power $P \text{ (kW)} = I \text{ (Amps)} \times V \text{ (Volts)} \times PF$ (Power Factor is a number between 0 and 1; example .9, which may be expressed as a percentage 90%)

Real Power $P \text{ (kW)} = \text{Apparent Power } S \text{ (kVA)} \times PF$ The reason for this is that in AC circuits the current can lag behind, or lead the voltage. Inductance (Motors, Transformers, etc.) causes the current to lag, and Capacitance causes it to lead. In heavy industry where there are lots of motors, ballasts or transformers, the lag can be significant. In a typical home it usually runs between 90 and 100%.

With a low power factor, the system needs to work harder to create the same energy. Generally, Utilities charge only for Real Power. So if that is the case, why do we care and why does TED display it? A few reasons:

1. If you are using more current to accomplish the same work, then there is greater voltage drop and line losses. (Consumer does pay for the line losses on the load side of the meter.)
2. Some utilities will charge a penalty or a demand charge to make up for their added cost in providing more apparent power kVA. The charge usually works like this: If your system demand is under, for instance, 5 kVA there is no charge. (Demand is based on running 15-minute averages typically so motor starting does not affect it). If your demand over the month is, let's say, 15 kVA, then you have exceeded the threshold by 10 kVA and if they charge you a demand charge of \$8.00 per KVA Demand Charge = 10kVA * \$8.00 per kVA = \$80.00 for the month.

There are only a few utilities in North America that currently make this kind of charge for residential customers, however it is becoming much more common as a way of capturing the added infrastructure costs. It is much more common in commercial facilities, and very common in industrial settings.

- Q.** What is TED?
- A.** TED stands for The Energy Detective. TED is an in-home real-time electricity monitor that gives you electricity data updated every second. You can view the data in both dollar and kW amounts, based on your specific utility bills.
- Q.** How does TED work?
- A.** TED's transmitting device, located in your circuit breaker panel, measures the amount of electricity coming into your home as you demand/use it, and transmits data every second over your receiving unit. The receiving display unit can be plugged into any A/C outlet in your home.
- Q.** Are there batteries to change?
- A.** No. TED will never have to have batteries changed. It is truly maintenance-free. (And TED only costs about \$0.08 per month to operate!)
- Q.** How accurate is TED?
- A.** TED is calibrated to be accurate to within 2%! (But you will likely find it to be closer to 1%).
- Q.** How sensitive is TED?
- A.** TED is sensitive to 1-WATT! If you turn on a 10-watt bulb, TED will know (and immediately show) that you turned on a 10-watt bulb! You will find those "phantom" loads!
- Q.** Is every TED compatible with Google PowerMeter?
- A.** All TED 5000 packages work with Google PowerMeter. The TED 1000 series does NOT work with Google PowerMeter.
- Q.** Do I need to reset TED each month?
- A.** No...TED is fully-automatic. Once set up, TED will perform all functions automatically!
- Q.** Can I use TED to measure individual circuits?
- A.** Yes....although TED is designed to measure your entire home, you can easily measure individual circuits simply by clipping the thumb-squeeze CTs over the circuit you wish to monitor.
- Q.** Does TED measure true power?
- A.** Yes, TED measures true RMS power; TED does take into account Power Factor.
- Q.** Can TED control appliances in my home?
- A.** TED is being designed to perform automatic load-shedding functions. See the 'SUPPORT' area for 3rd party applications using TED in Home Automation.
- Q.** Can I use TED to monitor a 'mother-in-law' apartment?
- A.** You certainly can. Simply clip the thumb-squeeze CTs over the supply to the apartment.
- Q.** Will I lose data if I unplug TED or if the power goes off?
- A.** No. TED stores data in non-volatile memory. You will never lose data. However, if you do unplug TED, any power being used will not be recorded.
- Q.** I have a Photovoltaic System and I send power back to the grid. Does TED perform net metering?
- A.** Yes. TED5000 does perform net metering. See the specs on TED 5000 Series.
- Q.** Where can I get TED?
- A.** TED is available through our secure online store, as well as hundreds of distributors located throughout the U.S. and Canada.

- Q. Will TED interfere with X-10 and other home automation systems?
A. TED has its own data transmission stream that should not interfere with any other home automation products.
- Q. Will my Utility reduce my electricity rate if I install TED?
A. Having TED in your home may qualify you for a different tariff schedule. You will need to check with your local utility.
- Q. Is TED more accurate than my utility meter?
A. If you feel that TED has presented a case of your meter being inaccurate, simply call your Utility. They will be happy to send someone out to confirm its accuracy. (TED is accurate to within 2% !!)
- Q. Will TED work with 230v 50Hz Service (service generally found outside of North America)?
A. Not at this time. We are working on developing a 230v50Hz system.
- Q. What is involved in installing TED?
A. A technically-savvy homeowner, neighbor, friend or electrician can easily install TED in 10-15 minutes. TED operates on the existing wires in your home, so there is no need to run any additional wires. To see a diagram of the installation, see Installation under the 'SUPPORT' heading.
- Q. Is TED hard to program?
A. TED is only as difficult to setup as your electricity bill is to understand. Once the 'setup' routine has been completed, TED permanently stores all the data that has been entered, even in the event of a power outage. Unlike your VCR it only needs to be re-programmed if your electricity rates change.
- Q. How long will it take to get my money back from the purchase of TED?
A. In the home of a conscientious energy consumer, it could be as short as a few months. It would certainly depend on one's use of TED. So, how fast do you want the payback to be? Using the analogy of the 'bathroom scale', how fast do you want to lose weight? It depends on how conscientious you are.
- Q. How much does TED cost?
A. TED 1000 has been designed to be affordable in almost every household, costing only \$119. And, with the passage of the 2004 Energy Bill, households could receive a 100% tax credit on the purchase of TED. And, TED will likely pay for itself in months! Then it's money in your pocket! Studies have shown that savings range from 10-20% when you are able to monitor your electricity usage in real time.
- Q. Can I purchase stock in Energy, Inc.?
A. Energy, Inc. is a privately-held company, and as such does not have stock available to the public. We are flattered by your interest, though.
- Q. Are there any other versions of TED?
A. We are working on a 3-phase unit for commercial applications, as well as a 240v 50Hz version for non-North American use.

TED Website <http://www.theenergydetective.com/>

The Green Panel <http://www.thegreenpanel.com/>

Great Lakes Energy Service, Inc. <http://www.greatlakesenergyservice.org>