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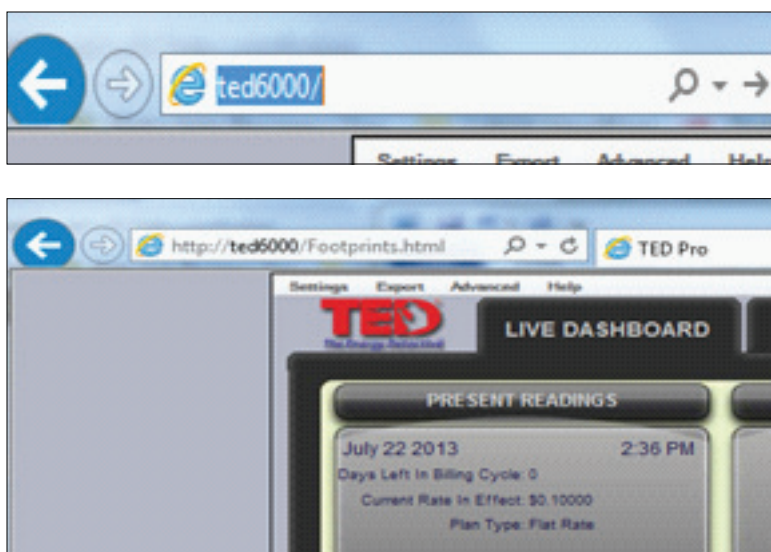
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Accessing Footprints

The Footprints Dashboard is a webpage that is served from the ECC device, (not from The Energy Detective website). An internet connection is not required to access Footprints, however your computer's Internet Browser software, (Internet Explorer, Firefox, Chrome, Safari) is used to display the Footprints page and Internet access is required to take advantage of some of the system features.

Open your Browser software, in the address bar at the top of the page, type "TED6000" and select ENTER. Most Browsers will then auto-fill the remainder of the address and load the Footprints Dashboard.



If your Browser does not load the Footprints page, you can access your router to determine the IP of the ECC and type the IP into the Browser address bar. You can also download the TED Installation Utility from the TED website (see the link below) and Run the installer. This 'installer' will locate the IP of your device. (If you do not have Internet access, see Appendix A of this guide.) Select your TED device when the installer locates it on your network and select *Launch in Browser*.

TED Installer download page: <http://www.theenergydetective.com/downloads-documents>

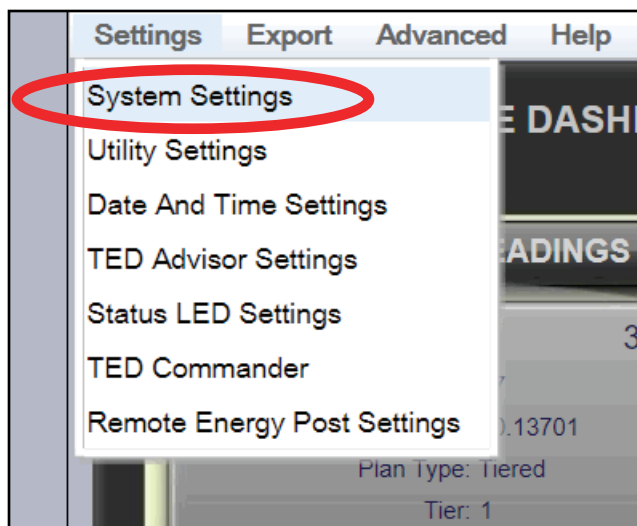
TED Installation	
The Installation Utility is searching for TED Devices on your network. Once the device is found, please select it from the list below.	
Found 4 devices	
Device Name	IP Address
TED5000	192.168.1.95
TED6000	192.168.1.105
TED PRO DEMO	192.168.1.138
MTU3000	192.168.1.137

When you first open Footprints, you will see the Live Dashboard Screen. None of the data will be populated until you complete the Setup procedures described below.

IMPORTANT NOTE: Once initial, first time Setup is complete, go to ADVANCED and select “**Reset Totals to Zero.**” This will initiate the TED system and begin logging Historical Data. It is suggested that after any subsequent changes are made to the settings (Particularly the Time/Date settings), go to the MINUTE graph and verify that all MTUs are recording data. If not, go to ADVANCED and Reset Totals to Zero.

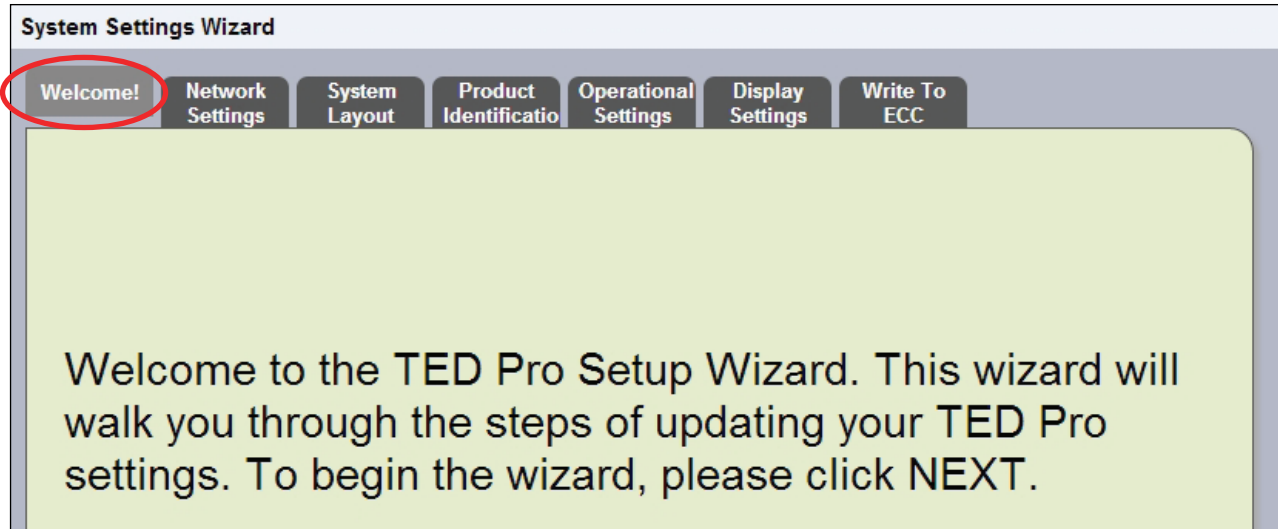


To get your system up and running, please follow these steps completely. Under the SETTINGS tab, press System Settings as shown below to begin the Setup process.



Next you will see the Welcome screen. You can move from screen-to-screen by pressing the next/previous button or by selecting the specific TAB you want. Let's go through the screens one by one: Please note that for most users the optimum settings are already set by default. Other than the Product IDs, we highly recommend that you leave the settings as-is until you fully understand how it works and exactly what it is you want to change.

The System can be modified at any time simply by going through this System Setup Wizard.

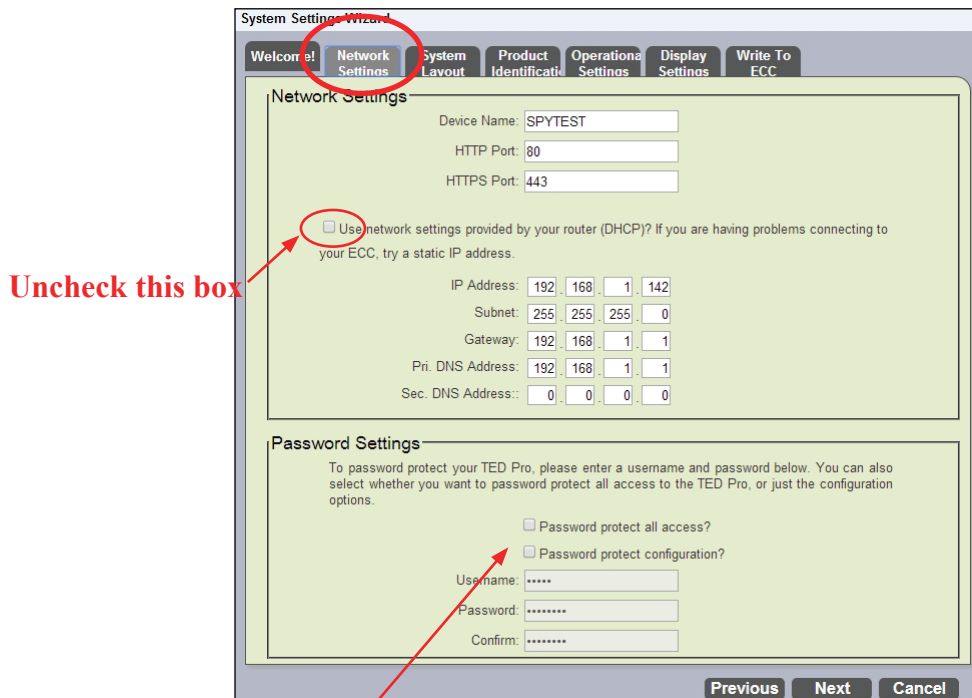


Network Settings tab

If you are connected to a standard router, you should not need to change the default settings at all.

The only change you should make is to UNCHECK the box indicated below. This will make the IP address static as assigned by your router. All of the information should auto-fill. Do not change any of these numbers.

If you are connecting directly to your computer (**not recommended**) see Appendix A.



Password Protection

To password-protect Footprints page or configuration, select the appropriate box and enter your user name and password. You will be prompted for your selections when you update the settings. (You may have to select Update again after entering your username and password.)

System Layout

Here is where we tell TED about your installed system. If you have typical installation with one MTU, one ECC and one Display, then you won't need to change anything. If you have more than one MTU (Dual Panel or Solar/Wind Package) then change the quantities as required.

System Settings Wizard

Welcome! Network Settings **System Layout** Product Identification Operational Settings Display Settings Write To ECC

MTU Configuration

Do you have more than one MTU for this system? ☒ No ☐ Yes

Display Configuration

How many Wireless Displays do you have?

Multiple MTUs

System Settings Wizard

Welcome! Network Settings **System Layout** Product Identification Operational Settings Display Settings Write To ECC

MTU Configuration

Do you have more than one MTU for this system? ☐ No ☒ Yes

Will you be monitoring generation (solar/wind/etc)? ☒ No ☐ Yes

How many MTUs do you have?

Please select what each MTU is monitoring: MTU 1: MTU 2:

Display Configuration

How many Wireless Displays do you have?

Either USNAP 1 or USNAP 2 port may be selected for use with Wireless Display. See appendix B for USNAP installation.

System Settings Wizard

Welcome! Network Settings **System Layout** Product Identification Operational Settings Display Settings Write To ECC

MTU Configuration

Do you have more than one MTU for this system? ☐ No ☒ Yes

Will you be monitoring generation (solar/wind/etc)? ☒ No ☐ Yes

How many MTUs do you have?

Please select what each MTU is monitoring: MTU 1: MTU 2:

Display Configuration

How many Wireless Displays do you have?

Which USNAP port is the display module connected to?

Product IDs (Extremely important)

MTU ID: Carefully type in the six digit ID numbers (serial numbers) for each MTU into the Product ID field. The IDs are labeled on the MTU case in the format 13 12 34 or 16 12 34, depending on model. If you selected more than one MTU on the previous screen, the respective number of MTU-IDs will automatically appear and require IDs.

TCP Checkbox: The TED Pro MTU has the option of TCP (Transmission Control Protocol) communication through an Ethernet connection. If you have a TED Pro MTU connected via Ethernet connection, select the TCP Checkbox beside this MTU ID and enter the IP address of the MTU. If you do not know the MTU IP address, it can be determined by running the TED Installation utility, <http://www.theenergydetective.com/downloads-documents>, or accessing the router's DHCP client list. (If MTUs are communicating through the power lines to the ECC, do not check the TCP checkbox. TCP option is not available on PRO Lite or Pro Home MTUs.)

DISPLAY ID: If you have an optional Wireless Display, you will need to enter the ID number. Hold the button on the Display for 30 seconds to enter the settings menu. The Wireless Display ID will be in the format 30 12 34. Carefully enter the number into Product ID field. If you have a Wired display that connects to the back of the ECC, no ID number needs to be recorded in the Display Product ID field.

System Settings Wizard

Welcome! Network Settings System Layout **Product Identification** Spyder Settings Operational Settings Display Settings Write To ECC

Please enter the Product ID and Descriptions for your devices

MTU Products

The Product ID numbers are located on the label of the MTU. The MTU is the device that is located in your panel.

	Product Id	Description	Use Spyder 1?	Use Spyder 2?	Use TCP?	IP Address
MTU 1	130EFF		☒	☐	☒	192 168 1 111
MTU 2	000000		☐	☐	☐	0 0 0 0 * Required

ECC Products

If configured correctly, this number will match the ID located on the label of your ECC. The ECC is the device that plugs into the wall and has an ethernet port connected to your router or PC

Product Id	Description
260979	

Wireless Display Products

The wireless display is the handheld device that displays data. The Product ID is located on the label on the back of the display. Please ensure that the Display is firmly seated in the charging stand. Never leave the display out of the charging stand for more than 4 hours as this may damage the battery.

Product Id	Description
Display 1 000000	

SPYDER

The Spyder is an optional add-on component for TED Pro, which allows for the monitoring of branch circuits within an electrical panel. If your system does have a Spyder, you will need to check the box next to the appropriate MTU it is connected to (See above). The Spyder behaves differently from an MTU, in that it does **not** record SECOND-data; it does record MINUTE, HOUR, etc. Each 'leg' of data is stored independently and can be viewed on the Spyder Summary, graphs, historically, or exported.

We highly recommend that you read the entire section on the Spyder setup so that you have a good understanding of the procedures and how it will work.

When installing the Spyder in your electric panel, it is vital that you make note of the circuit that each CT is connected to. Once the Spyder is installed, you will **name** the corresponding leg-connection.

Leg number 1 must correspond with the same leg number as shown in the picture here. Note on the Spyder (image below) that each 'leg' is numbered.



Naming your Spyder legs in the Reference Diagram is purely for your reference, to help you remember what Circuit each CT is connected to.

The names that you input under the “Graph Description” will appear in the Spyder Summary, Graphs, Export, etc. You may desire to simply use the names from the Reference Diagram above as your Graph Descriptions, however, if you GROUP some of the legs to arrive at a composite measurement, you may desire to have a totally different name. See GROUPING section below for more details.

You are not required to use all eight Graph Description fields, but DO NOT SKIP Graph Description fields. i.e., if you are using only four circuits or groups on a particular Spyder, use the “top” four Graph Descriptions and leave the bottom four blank. DO NOT select the check boxes on rows that will not be given a Graph Description.

MULT (multiplier)

The multiplier can be changed, depending on the type circuit you have connected the CT to. If it is a regular single-pole breaker, 110V circuit, you would leave the default of 1 selected. If the CT has been installed around one leg of a 240V 2-pole breaker (like an AC compressor as shown on Leg 1 above), you have the option of either a) using a single CT and changing the Multiplier to “2”, or b) use a second CT to connect to the second leg - in which case you would leave each multiplier set to “1.” The loads are generally balanced in a residence, and you would be fine using a single CT on a 2- or 3-pole breaker and setting the multiplier at a 2 or 3, whichever is appropriate. However, in a commercial or industrial setting, it would be wise to measure the circuit to determine whether it is balanced or not.

USING 20A CTs

If using 20A CTs, check the appropriate leg in the circuit reference diagram. (Note: If using TCP Ethernet communication from a Pro MTU to the ECC and using 20A CTs, the 20A CT selection must be made from MTU UI page.)

SOLAR

If you use a Spyder leg to monitor your SOLAR/WIND PRODUCTION, the multiplier must be changed to a NEGATIVE number. **NOTE: We do not recommend using a Spyder for Solar or Wind; we recommend using a 2nd MTU/CT set.**

Check the boxes diagonally as they relate to the Circuit indicated above the boxes.

THEN, take the names from the Circuit Reference Diagram and list them down the 'Graph Description' column.

Graph Description	1	2	3	4	5	6	7	8
AC COMP	☒	☐	☐	☐	☐	☐	☐	☐
KITCH LT	☐	☒	☐	☐	☐	☐	☐	☐
AC FAN	☐	☐	☒	☐	☐	☐	☐	☐
DSH WASH	☐	☐	☐	☒	☐	☐	☐	☐
Dryer	☐	☐	☐	☐	☒	☐	☐	☐
Sub Pnl	☐	☐	☐	☐	☐	☒	☐	☐
Oven	☐	☐	☐	☐	☐	☐	☒	☐
Mom	☐	☐	☐	☐	☐	☐	☐	☒

GROUPING Spyder Legs

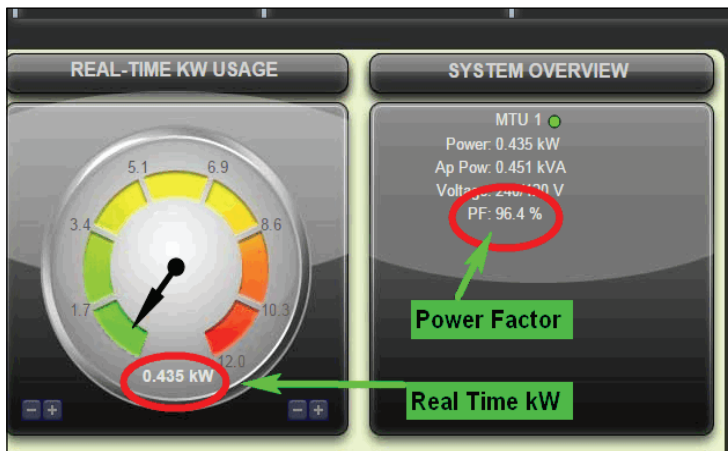
As previously noted, it is possible to group Spyder legs. Grouping legs gives you many options. The only drawback to grouping Spyder legs is that it takes up a memory location(s) within TED. Each Spyder has 8 allocated memory locations. You can use the 8 locations to store data from the eight individual CTs that you connected - as shown above.

For example, most air conditioning systems have two components - the compressor and the fan (or blower). If you want to see what your *entire* AC system costs, you would need to combine the compressor with the fan. In the example to the right, you will see that we have changed the 2nd slot to read "AC All" and selected Circuits 1 and 3 to be a group, and moved "Kitch Lt" down a line.

In this example, you will see that we no longer have the "AC Fan" as a line-item, so it will not show up on any graphs, history, etc. We have "AC All" in the space where 'AC Fan' was - so that is what will appear in the Graphs, History, etc. Notice that 'AC Fan' leg in the Circuit Reference Design remains on leg 3. You can calculate what the AC Fan load is by subtracting the "AC Comp" from the "AC All."

Graph Description	1	2	3	4	5	6	7	8
AC Comp	☒	☐	☐	☐	☐	☐	☐	☐
AC All	☒	☐	☒	☐	☐	☐	☐	☐
Kitch Lt	☐	☒	☐	☐	☐	☐	☐	☐
Dsh Wash	☐	☐	☐	☒	☐	☐	☐	☐
Dryer	☐	☐	☐	☐	☒	☐	☐	☐
Sub Pnl	☐	☐	☐	☐	☐	☒	☐	☐
Oven	☐	☐	☐	☐	☐	☐	☒	☐
Mom	☐	☐	☐	☐	☐	☐	☐	☒

Spyder Calibration and Power Factor



Power Factor is an important variable when determining the accuracy of power measurement. While the MTU accurately **MEASURES** the power factor, the Spyder **ASSUMES** a power factor of 92%. Observe the System Overview of the Dashboard when a Spyder load is essentially the only active load and you will get a good sense of the power factor based on the measured power factor of the panel. If the power factor differs from assumed 92%, you can calibrate against the MTU to improve the Spyder accuracy.

To calibrate a particular Spyder leg against the MTU:

1. Get the MTU value:
 - a. Observe the kW change of the Real-Time Dial when the load is turned on, OR
 - b. For the most precision – connect the MTU CT(s) to the same conductor the Spyder CT(s) is connected to in the panel and turn on the load.
2. Get the Spyder reading: Leave the Spyder load on for at least 3 minutes before recording the value from the Spyder Tab. It should be a consistent number.
3. Let's do some math ☺

Single phase load: $\text{MTU Value} \div \text{Spyder Value} = \text{the Calibration Multiplier}$.

Two pole (or three pole breaker): $\text{MTU Value} \div \text{Spyder Value} \times 2 \text{ (or 3)} = \text{the Calibration Multiplier}$.

Example 1: A single phase load where the MTU reads higher than the Spyder: MTU reads 1.2 kW, Spyder reads 1.15 kW. The math is $1.2 \div 1.15 = 1.04$

Example 2: A Spyder CT is on one leg of a two pole breaker. With a multiplier of 2.0 on the Spyder leg, the MTU reads less than the Spyder: MTU reads 3.5 kW, Spyder reads 3.65 kW. The math is $3.5 \div 3.65 \times 2 = 1.92$

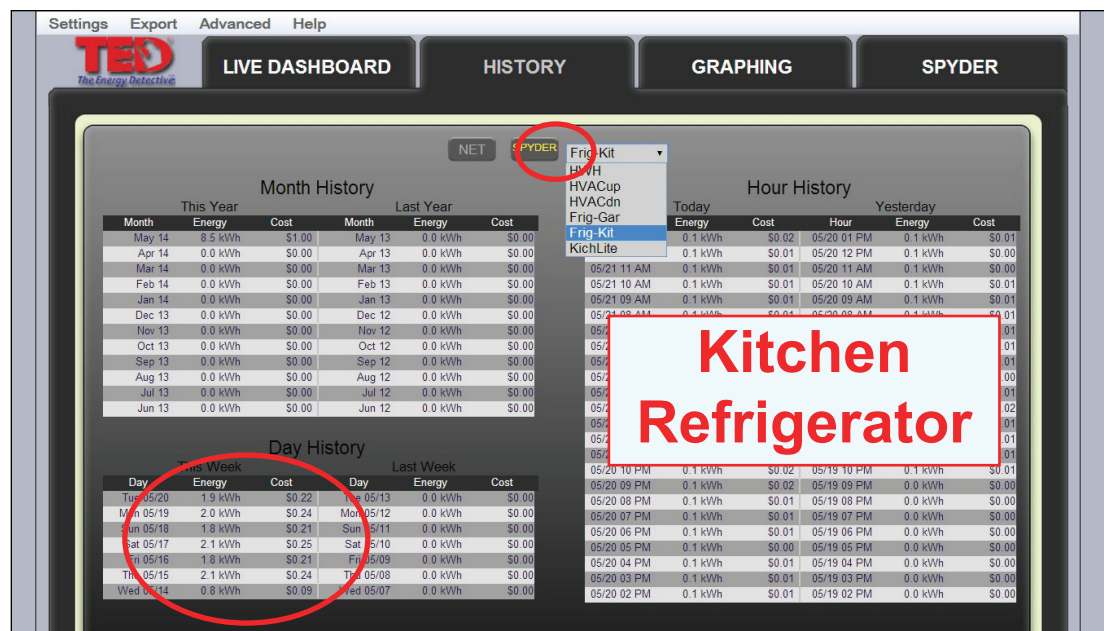
4. In the System Settings, enter the Calibration number into the Multiplier setting of the appropriate Spyder leg and UPDATE the settings in the WRITE TO ECC tab.

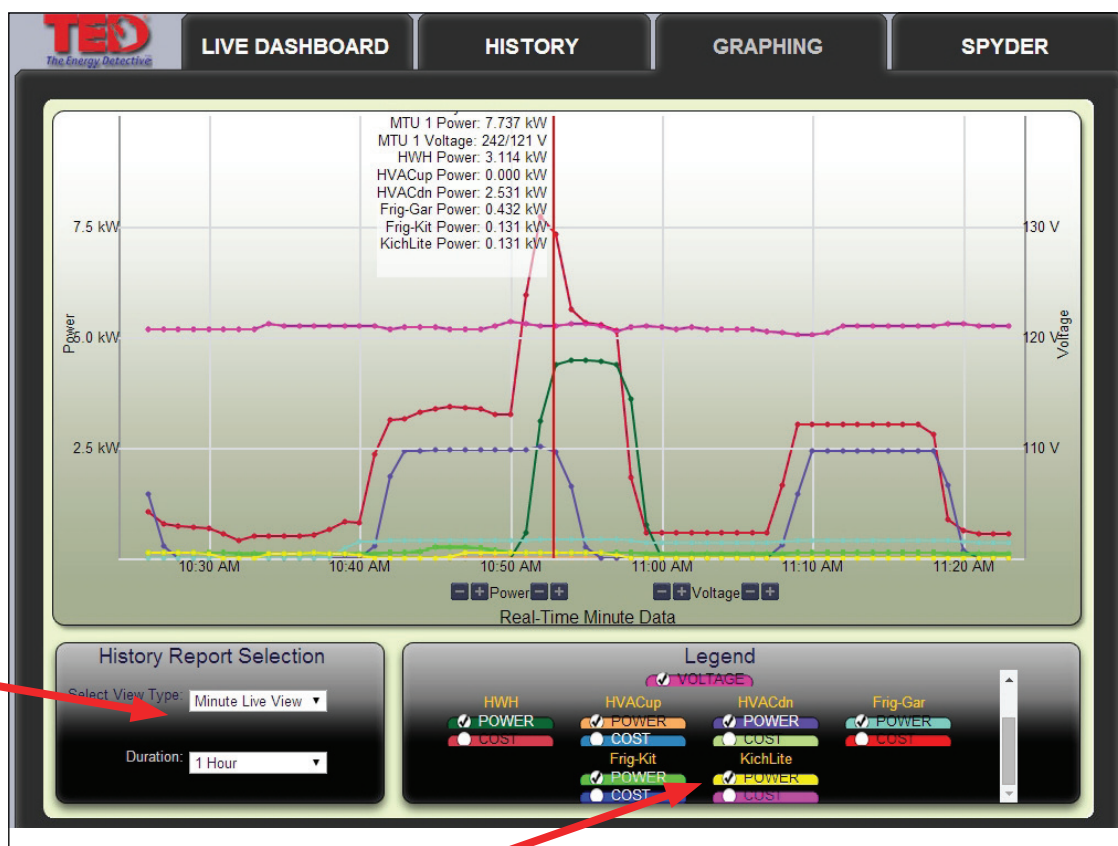
A few miscellaneous comments regarding the Spyder:

- You can use a leg in as many Groups as you wish;
- You can have as many legs in a Group as you wish;
- A single MTU can accommodate two Spyders.
- You can not add a leg from Spyder 1 to be in a Group in Spyder 2;
- Spyder second-data is not recorded (minute, hour, day, etc. are recorded)
- Leg-loads less than 150 Watts will be less accurate.
- Spyder-data can be exported to CSV-file (Excel) at any time

History Tab - SPYDER

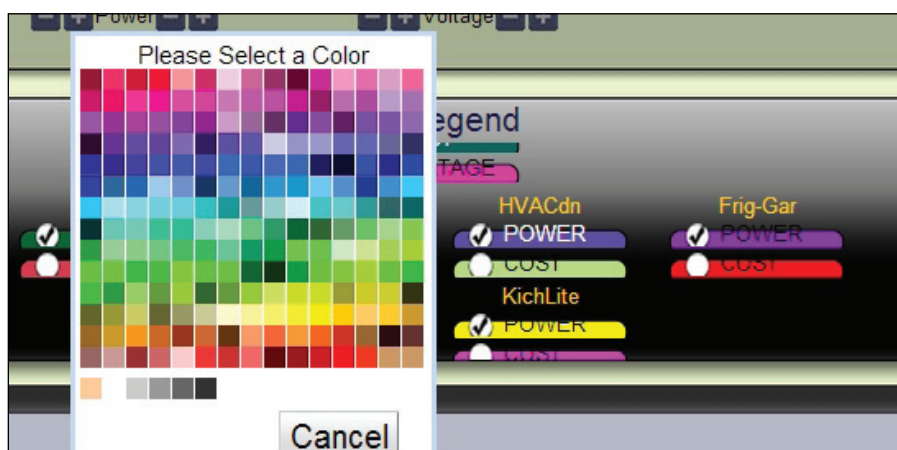
By selecting the HISTORY tab and then clicking on the SPYDER button at the top, you can choose to view the data of any of your Spyder legs (via the drop-down). The images below show a 'kitchen refrigerator' and a "beer fridge" that have had a TED Spyder monitoring them for only a week. You can see that the kitchen fridge uses about \$0.23 per day...which will equate to about \$84 per year, while the beer fridge is using about \$0.80 per day (\$292/year). Definitely getting rid of the beer fridge energy hog and getting a more economical refrigerator!





Select the Spyder component(s) that you wish to show on the graph.

Note, you can change the color of the device on the graph simply by putting your cursor over the device you want to select, and left-clicking...then select a different color from the chart that appears.



Operational Settings

These settings control how often information is updated in the system.

Display Settings

Your Wireless Display is very flexible; you can adjust the backlight, sleep and scroll settings, you can also select which screens to display. You can check one, any, or all of them depending on which information is important to you. The following choices apply to the optional Wireless Display.

System Settings Wizard

Welcome! Network Settings System Layout Product Identification Spyder Settings Operation Settings **Display Settings** Write To ECC

ECC Display Settings

Scroll Timer: 5 secs ☐ Enable Scroll Timer

Contrast: 65 %

Wireless Display Settings

Backlight Settings on Power: 60 %

Backlight Settings on Battery: 40 %

Backlight Timer: 30 secs

Scroll Timer: 5 secs

Battery Mode Sleep Timer: 120 secs

Contrast: 72 %

Screens

- ☒ Real-Time Use
- ☒ Recent Usage
- ☒ Month To Date
- ☒ Monthly Projections
- ☐ CO2 Panel
- ☒ Voltage
- ☐ kW Detail Today
- ☐ Spending Detail Today
- ☐ Multi-Panel

Previous Next Cancel

See page 17 of the User's Manual for additional Footprints and graphing options available under the Advanced tab on the Dashboard.

Write to Device

Like any software program, you need to save the changes you made. Changes will be applied when you click the Update button.

Update

You will use this function *every time* you make a change to your TED Pro system. This will update the changes you make and save them to the ECC.

Backup Settings

Before updating changes, you can save the previous settings to a file on your PC. (Recommended)

Restore Settings

You can restore settings that you previously saved to a file on your PC. The restored settings will be applied when the Update button is selected.

System Settings Wizard

Welcome! Network Settings System Layout Product Identification Spyder Settings Operational Settings Display Settings **Write To ECC**

Apply Settings to the ECC

Do you wish to update your ECC with these new settings? **Update**

Backup Settings

Do you wish to back-up your current ECC settings to disk? **Backup**

Note: This will save the settings that are currently active on your ECC to disk. Any settings that have been changed but not written to the ECC will not be saved.

Restore Settings

Do you wish to restore your settings from disk?

Choose File No file chosen

Previous Cancel

After pressing UPDATE, the progress bar will indicate that it is writing the data to the ECC.

Apply Settings to the Gateway

Do you wish to update the Gateway with these new utility settings? **Update**

Updating System Voltage

26%

Previous Next Cancel

Wait for the progress bar to read 100%, then you press Finish. Footprints will then refresh your browser and the system will begin operation with your new settings. You may make changes to the Settings at any time.

IMPORTANT NOTE: Once initial, first time Setup is complete, go to ADVANCED and select “**Reset Totals to Zero.**” This will initiate the TED system and begin logging Historical Data. It is suggested that after any subsequent changes are made to the settings (Particularly the Time/Date settings), go to the MINUTE graph and verify that all MTUs are recording data. If not, go to ADVANCED and Reset Totals to Zero.

System Settings Wizard

Welcome! Network Settings System Layout Product Identification Spyder Settings Operational Settings Display Settings **Write To ECC**

Apply Settings to the ECC

Do you wish to update your ECC with these new settings? **Update**

Backup Settings

Do you wish to back-up your current ECC settings to disk? **Backup**

Note: This will save the settings that are currently active on your ECC to disk. Any settings that have been changed but not written to the ECC will not be saved.

Restore Settings

Do you wish to restore your settings from disk?

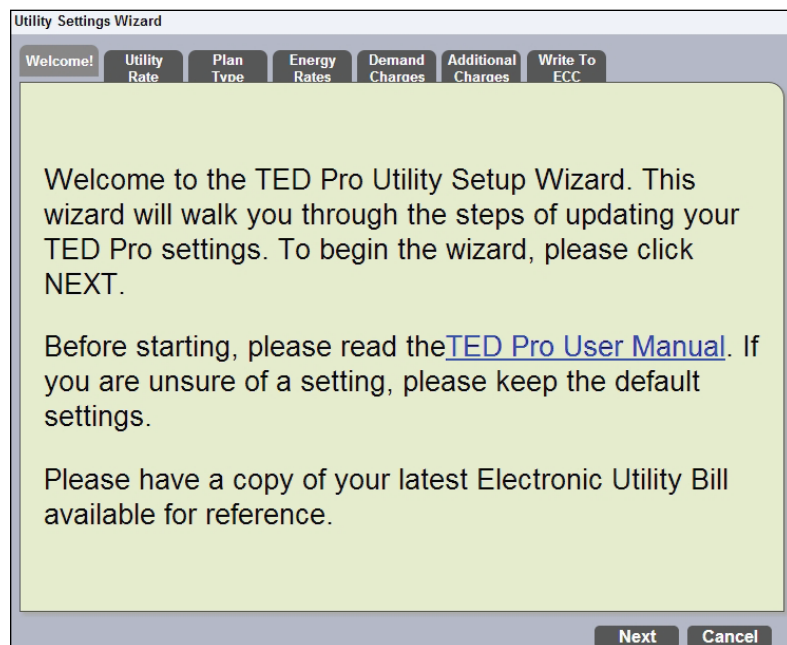
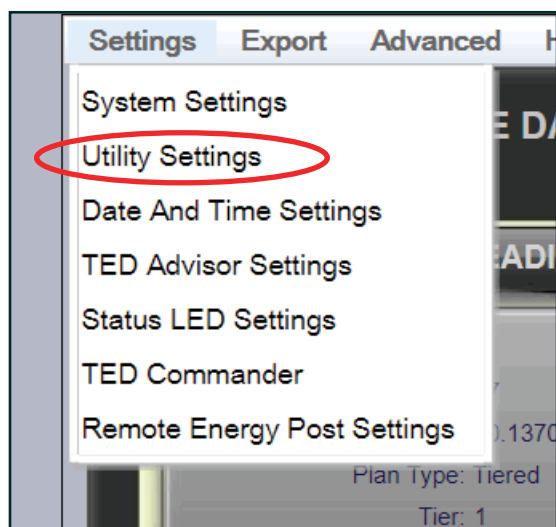
Choose File No file chosen

Previous Cancel

See page 27 of the User's Manual for additional Footprints and graphing options available under the Advanced tab on the Dashboard.

Utility Settings Wizard

These settings affect the **rate calculations** of your TED Pro system. It would be most helpful to have your most recent electric bill handy for this.



A screenshot of the 'Utility Settings Wizard' showing the 'Network Settings' and 'Utility Seasons' screens. The 'Utility Rate' tab is circled in red. In the 'Network Settings' section, 'What is the Meter Read Date?' is set to '3'. In the 'Utility Seasons' section, 'How many energy rate seasons does your utility use?' is set to '4'. Below this is a table for seasons and their end dates:

Season	Season End Date
Spring	Mar 21
Summer	Jun 20
Fall	Sep 22
Winter	Dec 31

Below the table, it says 'Season End Dates must be in chronological order'. At the bottom are 'Previous', 'Next' (circled in red), and 'Cancel' buttons. Red arrows point from the 'Next' button to the 'Utility Rate' tab and from the 'Utility Seasons' section to the 'Next' button.

TED Pro automatically resets the billing cycle based on the Meter Read Date. This date may fluctuate from bill-to-bill by a couple of days (depending on weekends, etc), but it will generally be pretty reliable. Do not change the Meter Read Date if your bill comes in and the date is off by one or two days, because your next month bill will likely adjust for it.

Select 1 if your utility does not have tariffs for different seasons of the year.

Select 2 if you have SUMMER and WINTER rates.

Select 3 if you have THREE seasons.

Select 4 if you have WINTER, SPRING, SUMMER, and FALL rates

Select NEXT after making your selection

Utility Settings Wizard

Welcome! Utility Rate **Plan Type** Energy Rates Demand Charges Additional Charges Write To ECC

Utility Seasons

Please select your plan type: Flat ▼

Choose your rate plan type here

FLAT - a fixed price per kWh. (i.e. \$0.1152)

TIERED - Your utility bill uses a tiered formula. (i.e. \$.xxxx for 1st xxx kWh and \$.xxxx for 2nd xxx kWh and \$.xxxx for 3rd kWh and so on.)

TIME OF USE - Your utility has different rates during different times of the day. (i.e. From 8-10a.m. is \$.xxxx kWh, from 1-6pm is \$.xxxx kWh.)

TIERED WITHIN A TIME OF USE - Choose this if your utility bill is based on a Tiered system within a Time of Use system. (i.e. \$0.xxxx for 1st xxx kWh from 8-10a.m., \$0.xxxx per kWh for 2nd kWh from 8-10a.m., etc.)

Previous **Next** Cancel

Select NEXT after making your selection

The Rate Plan Type selected will determine what the next screen will show

Screen Samples showing FLAT RATE with SEASONS

Utility Setup Wizard

Welcome! Utility Rate Setup Plan Type **Energy Rates** Additional Charges Write To Device

Please enter your utility's rates:

Energy Rates

0.10000 \$/kW

Previous Next Cancel

Note: The format used for *CENTS per Kilowatt Hour* is \$0.xxxxx, where "x" is the actual cents charged. Think about it ... how do you write **thirteen cents**? Answer: \$0.13000

These are the screens that you would see if you were to select 1 Season, 2 Seasons, 3 Seasons, and 4 Seasons.

Utility Setup Wizard

Welcome! Utility Rate Setup Plan Type **Energy Rates** Additional Charges Write To Device

Please enter your utility's rates:

Winter

0.10000 \$/kW

Summer

0.00000 \$/kW

Previous Next Cancel

Utility Setup Wizard

Welcome! Utility Rate Setup Plan Type **Energy Rates** Additional Charges Write To Device

Please enter your utility's rates:

Season 1

0.10000 \$/kW

Season 2

0.00000 \$/kW

Season 3

0.00000 \$/kW

Previous Next Cancel

Utility Setup Wizard

Welcome! Utility Rate Setup Plan Type **Energy Rates** Additional Charges Write To Device

Please enter your utility's rates:

Winter

0.10000 \$/kW

Spring

0.00000 \$/kW

Summer

0.00000 \$/kW

Fall

0.00000 \$/kW

Previous Next Cancel

Screen Sample showing **TIERED RATE** with 2 SEASONS

Utility Setup Wizard

Welcome! Utility Rate Setup Plan Type **Tiers** Energy Rates Additional Charges Write To Device

Tiers

How Many Tiers? 2

Winter

	from	to
Tier 1	0	800
Tier 2	801	

Summer

	from	to
Tier 1	0	1200
Tier 2	1201	

Upon entry of the **kWh** break point of the 1st Tier, the second break point will automatically appear. You will then enter the kWh break point of the 2nd Tier. The beginning of the 3rd Tier will automatically appear. After you've entered the next-to-last kWh break point, TED will automatically show the beginning of the 'balance' of kWh.

Previous Next Cancel

Utility Setup Wizard

Welcome! Utility Rate Setup Plan Type **Tiers** Energy Rates Additional Charges Write To Device

Tiers

How Many Tiers? 3

Winter

	from	to
Tier 1	0	800
Tier 2	801	802
Tier 3	803	

Summer

	from	to
Tier 1	0	1200
Tier 2	1201	1202
Tier 3	1203	

Previous Next Cancel

Utility Setup Wizard

Welcome! Utility Rate Setup Plan Type **Tiers** Energy Rates Additional Charges Write To Device

Tiers

How Many Tiers? 4

Winter

	from	to
Tier 1	0	800
Tier 2	801	802
Tier 3	803	804
Tier 4	805	

Summer

	from	to
Tier 1	0	1200
Tier 2	1201	1202
Tier 3	1203	1204
Tier 4	1205	

Previous Next Cancel

Screen Samples showing TIME OF USE RATES with SEASONS

Utility Setup Wizard

Welcome! Utility Rate Setup Plan Type **TOU** Energy Rates Additional Charges Write To Device

TOU Rates

How Many TOU Rates? **4** TOU Rate Applicable? ☐ Saturday? ☐ Sunday? ☐ Holiday

Most utilities consider weekends and holidays OFF PEAK. Check here if that is **NOT** the case.

TOU Times

Notice that each rate can be in the AM **and** the PM. If a rate occurs only once in the day, leave the other (AM or PM) at the default of 12:00 - 12:00.

	Winter				Summer			
	AM TOU		PM TOU		AM TOU		PM TOU	
	from	to	from	to	from	to	from	to
Super-Peak	12:00AM	12:00AM	12:00AM	12:00AM	12:00AM	12:00AM	12:00AM	12:00
Mid-Peak	12:00AM	12:00AM	12:00AM	12:00AM	12:00AM	12:00AM	12:00AM	12:00
Peak	12:00AM	12:00AM	12:00AM	12:00AM	12:00AM	12:00AM	12:00AM	12:00
Off-Peak	All Other Times				All Other Times			

If you have entered multiple Seasons, you will need to input the TOU periods for all seasons as well.

Select NEXT when completed

Previous **Next** Cancel

Utility Setup Wizard

Welcome! Utility Rate Setup Plan Type TOU **Energy Rates** Additional Charges Write To Device

Please enter your utility's rates:

Winter

Super-Peak	Mid-Peak	Peak	Off-Peak
0.10000 \$/kW	0.00000 \$/kW	0.00000 \$/kW	0.00000 \$/kW

Enter the corresponding rates. If your utility has a 6th digit, just round it up/down.

Summer

Super-Peak	Mid-Peak	Peak	Off-Peak
0.00000 \$/kW	0.00000 \$/kW	0.00000 \$/kW	0.00000 \$/kW

Select NEXT when completed

Previous **Next** Cancel

Demand Charges

Demand charges can often be the larger part of a commercial facility's electric bill.

Utility Setup Wizard

Welcome! Utility Rate Setup Plan Type TOU Energy Rates **Demand Charges** Additional Charges Write T

Demand Charges

Does your utility apply demand charges? ☒

What type of demand charge does your utility use? ☐ Demand Steps ☒ TOU Based

Are demand charges based on kW or kVA? ☒ kW based ☐ kVA based

Are demand charges applicable on the following days? ☐ Saturday? ☐ Sunday? ☐ Holidays? ☐ Off Peak?

Please enter the tou and associated charges.

	Winter \$/kW	Spring \$/kW	Summer \$/kW	Fall \$/kW
Peak	12.420	12.420	17.750	12.420
Off-Peak	65.000	5.380	5.380	65.000

Utility Setup Wizard

Welcome! Utility Rate Setup Plan Type TOU Energy Rates Demand Charges **Additional Charges**

Energy or Fuel Surcharge

Is there an Energy or Fuel Surcharge? This is a charge billed by some, but not all utilities from time to time to recover their costs for extraordinary fuel prices.

Fixed Charges

Does your utility make a Fixed Charge per period? For example, neighborhood street lighting costs, or any other recurring costs the Utility may pass on to the consumer. If more than one fixed fee applies, enter the sum of all fees.

	Winter	Spring	Summer	Fall
\$	1925.00	1925.00	1925.00	1925.00

Minimum Charge

Does your utility charge a Minimum Charge Per Period? Some utilities, in addition to a charge per kWh, have a minimum charge for electricity. This is typically a flat-fee.

Taxes

Are there municipal, state, or federal taxes applied to your bill? Charged as a percentage calculation of the entire bill. If you have multiple items on your bill that are calculated as a percentage, you can add them all together and enter them here.

	Winter	Spring	Summer	Fall
%	13.50	13.50	13.50	13.50

Previous **Next** Cancel

Select NEXT when completed

Write to Device

Like any software program, you need to save the changes you made. Changes will be applied when you click the Update button.

Backup Settings

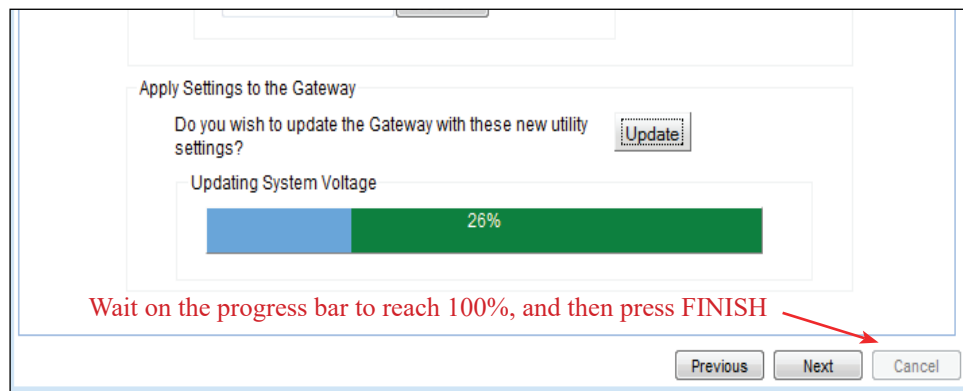
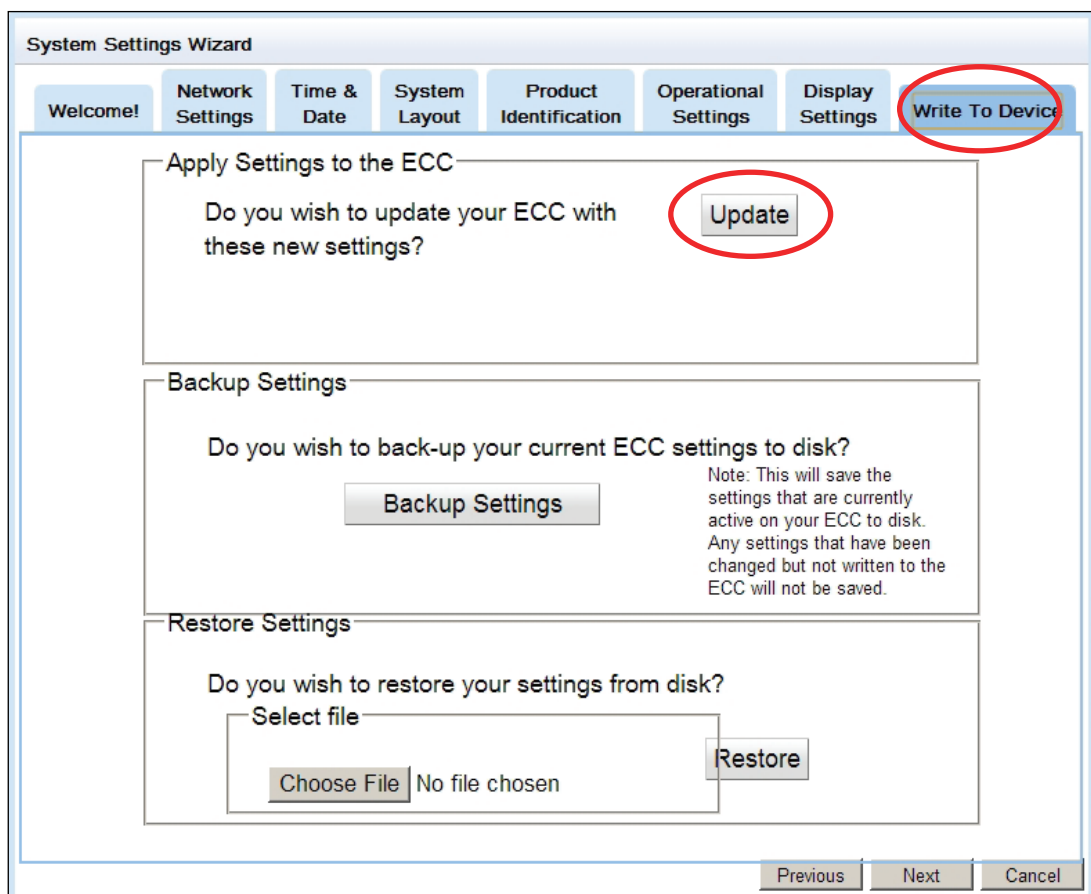
Before updating changes, you can save the previous settings to a file on your PC. (Recommended)

Restore Settings

You can restore settings that you previously saved to a file on your PC. The restored settings will be applied when the Update button is selected.

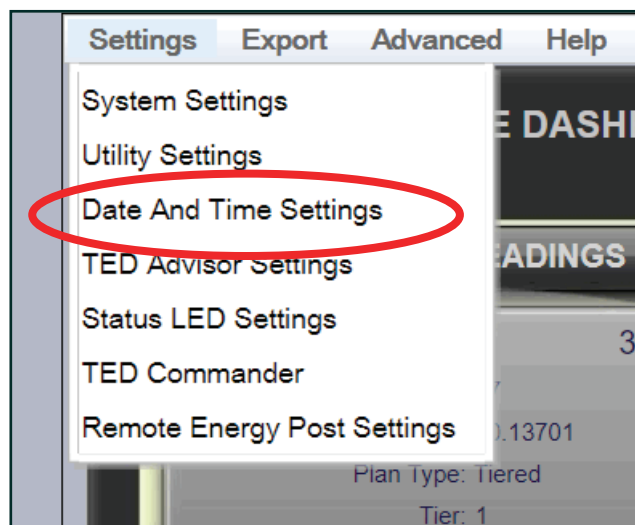
Update

You will use this function every time you make a change to your TED Pro system. This will update the changes you make and save them to the ECC. **Press UPDATE.**



Time and Date

If you are connected to the Internet (through your router or local network), TED will automatically retrieve the time. If not, uncheck the boxes and enter the time and date manually. Once set, the ECC will keep track of time, even during a power failure.



Date And Time Settings

Please use the fields below to change the date and time of your ECC or the location used for weather. Please note, if the date or time is changed, it will cause your monthly and daily totals to reset to zero.

Date And Time

☒ Synchronize ECC with a Time Server (NTP)

NTP Server:

Please set the date and time for the ECC.

Date:

Time:

Timezone:

☒ Adjust for Daylight Savings Time? This selection should match the computer on which Footprints is viewed. (This information will be found on your computer's TIME AND DATE or TIME ZONE settings.)

Weather Settings

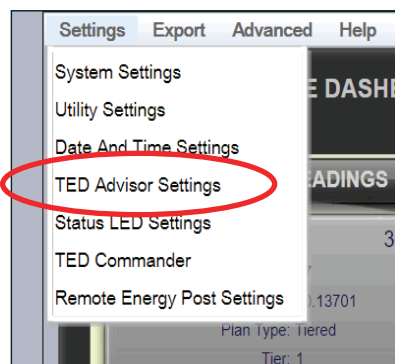
The location entered will be sent to weather.gov when \ obtaining weather information. If you wish to disable this feature, use the zip code of 00000.

Zip Code: ☐ Use Lat/Lon?

TED Advisor

TED Advisor is a real-time energy notification system. TED Advisor sends immediate notification, locally and remotely, via email and/or text message to let you know that a user-defined parameter has been reached.

You may need to call your Internet Service Provider (ISP) to obtain some of the details below.



NOTE: If you are posting to TED Commander, there are TED Advisor options in Commander that do not require entering mail server settings. It is very simple.

Mail Server Settings

TED Advisor uses your Internet Service Provider's outbound email server (SMTP) to send notifications via email. You will need to contact them to determine the correct server to use and whether or not SSL or authentication is required. In most cases they are not and the default settings are adequate as long as you provide the email address assigned to you by your ISP.

Who is your Internet service provider: Other:

Please enter the email address provided by your ISP:

Does your ISP require SSL for outbound emails?: ☒

What port does your ISP use for outbound email (usually port 25):

Does your ISP require authentication for outbound emails?: ☒

Advisor Recipient

Please enter the e-mail address that you wish to send notifications to. To send these as text messages to your phone, use your phone providers email-to-SMS gateway (e.g. 9875550100@SMS-gateway). A list of gateway addresses can be found [HERE](#).

Email Address:

CC:

Check the appropriate box for any parameter for which you would like notification.

Advisor Notifications

☐ Please send advice minutes before a new TOU rate.

☐ Please send advice when a rate change occurs.

☐ Please send advice when a new demand charge is reached.

☐ Please send advice when money spent exceeds \$ Send at Most

☐ Please send advice when money spent exceeds \$ Send at Most

☒ Please send advice when energy consumed exceeds kWh. Send at Most

☐ Please send advice when energy consumed exceeds kWh. Send at Most

☐ Please send advice when 10-minute kW average exceeds . Send at most

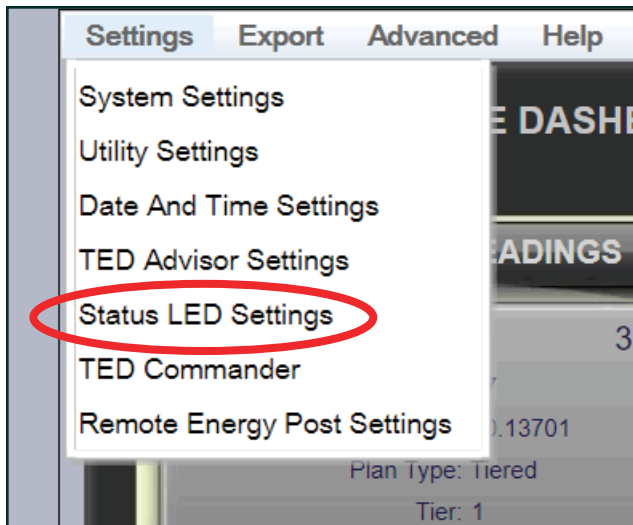
☐ Please send advice when 10-minute kW average exceeds . Send at most

☐ Please send advice when voltage goes above volts. Send at most

☐ Please send advice when voltage goes below volts. Send at most

Status LED Settings

Your ECC (Energy Control Center) has 3 LEDs on the face. These LEDs can be user-adjusted to be meaningful in several ways. They are Green, Yellow, and Red.



ECC Status LED Settings

Please modify the settings below to adjust how the LED's on the front of the ECC will display. The power and cost LED's are based on NET values in a multi-mtu system.

Pick One	Green	Yellow	Red
☐ Utility Rate	< 0.05000 /kWh	Between	> 0.10000 /kWh
☐ kW Now	< 5.0 /kW	Between	> 10.0 /kW
☒ \$/HR Now	< 0.10 /h	Between	> 0.50 /h

Save
Cancel

For Example: If you wanted the LEDs to give you an indication of how much money you were spending in real-time (without looking at a Display or your Computer), you can set the LEDs to change at specific intervals. In the above setting, the **Green** LED will be lit when you are spending less than \$0.10 per hour. The **Red** LED trigger-point is at \$0.50, so any value between \$0.10 and \$0.50 will turn on the **Yellow** LED. These values can be changed at any time.

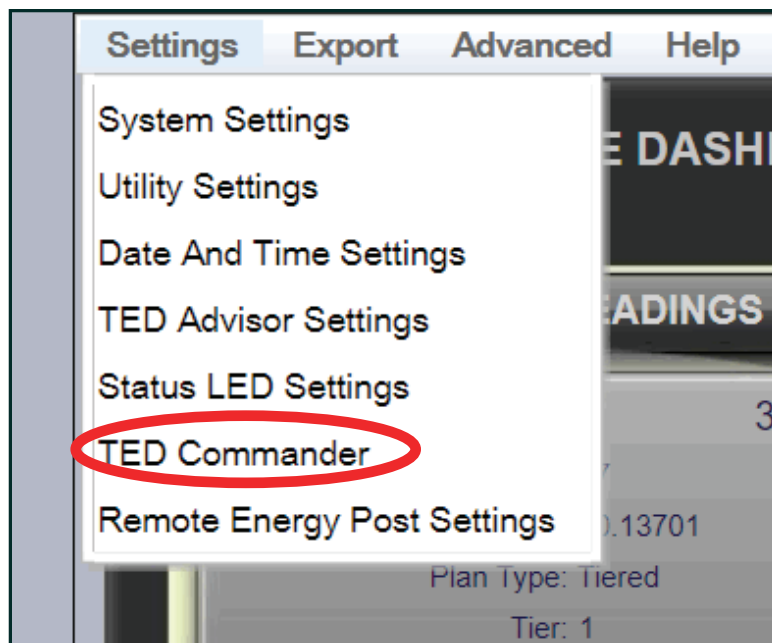
TED Commander

TED Commander is The Energy Detective's cloud portal that allows energy-data to post for remote access. Once activated, energy data posts every 1 minute.

To Activate the ECC to post data to TED's cloud server, select TED Commander and follow activation instructions. This will allow access to TED data from anywhere. The TED Commander Activation can be deactivated under Remote Energy Posting.

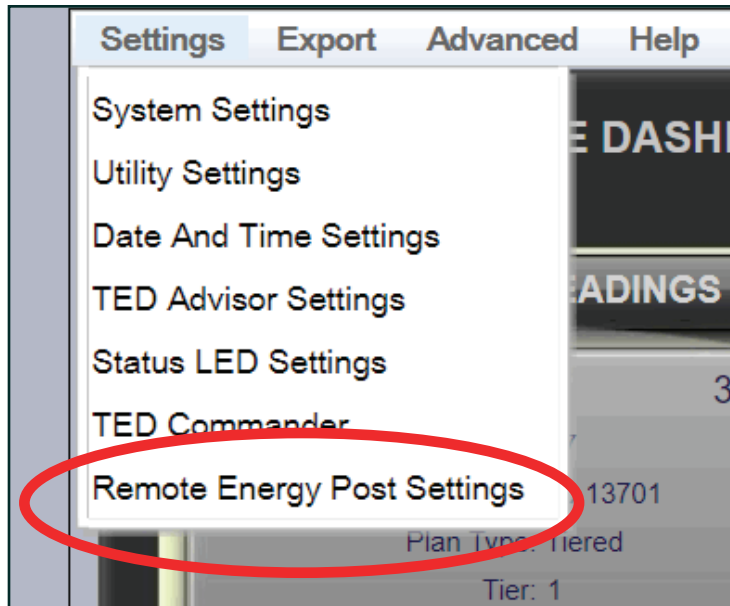
The TED Commander User Manual can be downloaded here, or from our website:

<http://www.theenergydetective.com/downloads/TED%20Commander%20User%20Manual%20Rev%202.0.pdf>



Remote Posting of Energy Data

If you wish to send your TED-data to an outside source (like a university, a neighborhood/community, a solar-company, a utility, or any other entity that is aggregating the data), this is a user-friendly way to do so. Just click the “Activate Energy Posting” button and follow the on-screen instructions. **Note:** You may post only to two sources at one time.



Activate Third Party Energy Posting

You can activate your TED Pro to post to a 3rd party service.

Note: Energy Inc. welcomes third part party apps, but Energy Inc. cannot provide technical support nor control the security and privacy of the data posted to a third party site. Users should try to contact the app's original developer with questions on the performance and security of third party applications.

To begin activation, please enter the data requested below. It should be provided to you by the 3rd party service you wish to post data to.

Activation Settings

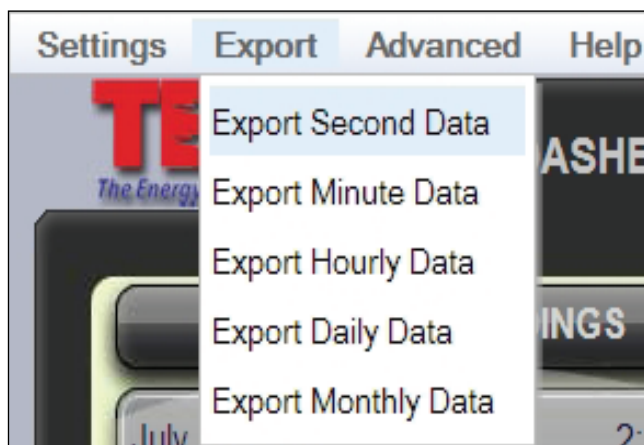
Activation URL:

Activation Key:

Activate Energy Posting

Cancel

Exporting Data



Data Export

Data can be exported in CSV format (Excel-format) at any time. The internal capacity of data that TED will store is:

Seconds: 60 minutes

Minutes: 48 hours

Hours: 90 Days

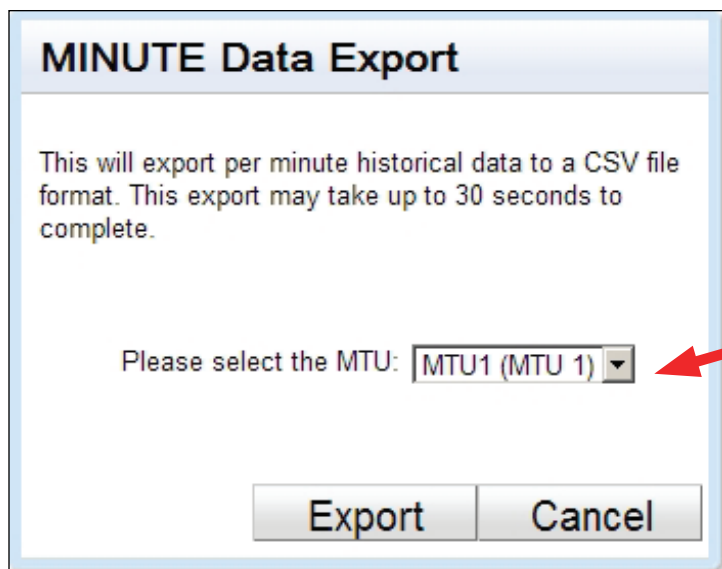
Days: 24 months

Months: 10 years

Each of these data-ranges are stored independently.

Data is saved in this manner - when the field is full (ex: 60 minutes of Second-data) the oldest record is erased and the new second-data is written.

To export the data, simply select the data you would like to export to analyze, and follow the on-screen instructions.

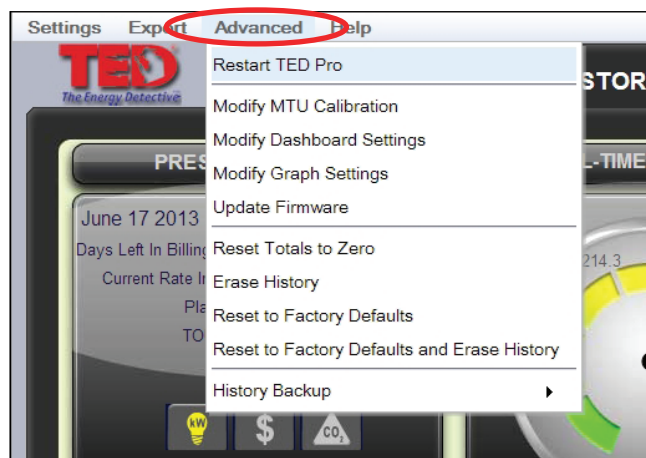


If you have multiple MTUs or a SOLAR/WIND installation, you can output the data for each MTU for analysis by clicking the drop-down.

ADVANCED FUNCTIONS

Restart TEDPro

Selecting “Restart TEDPro” accomplishes the same thing as unplugging your ECC. It is not something you will likely find yourself needing to do. It simply eliminates the need to physically unplug the ECC.



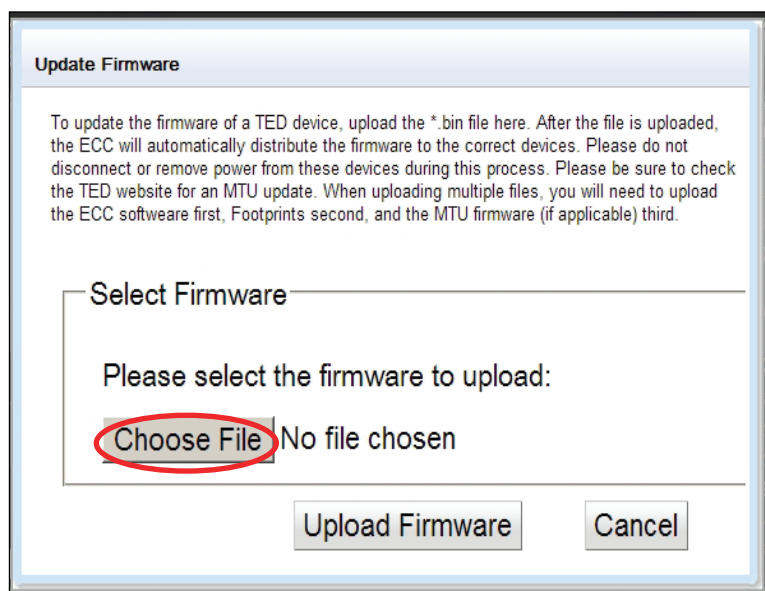
Firmware Update

You can update your Footprints firmware using the instructions below, but it is **HIGHLY** recommended that any firmware updates are done following directions on our website.

<http://www.theenergydetective.com>

(see note above on Firmware Update) There will be occasions when TED or your utility may have an update for your firmware. It could be an update for your Display, the MTU, or the ECC. It may be a rate change, software modification, or a new feature. There are several ways in which you can receive the update: by link in an email, a direct download from the TED website, or from your Utility's website. It will be your option to install the update.

Once you have downloaded the update to your computer, you will need to select the “Update Firmware” feature on TED Pro shown here.



Click the Browse button and locate the firmware you are wanting to update. Once you have located and selected the file, click UPDATE FIRMWARE. The process is totally automatic at this point. Depending on the size of the update, this process could take from one to 30 minutes.

Footprints Settings

You can adjust the ranges displayed within Footprints two ways. You can press the +/- buttons on each graph/range you would like to change, or you can click the **ADVANCED** tab, and Modify Dashboard Settings as shown below. NOTE: any changes made using the +/- keys are saved in *that specific computer's* browser only. They are not saved to any computers on the LAN. If multiple people are accessing the ECC, each person(s) viewing Footprints may customize their graphs on their particular computer.

Modify Dashboard and Modify Graph Settings under ADVANCED Tab:

The Max Value is the maximum amount shown on any graphs. If you have a small, energy-efficient facility, you may only see a maximum real time use of 5kW. Change the "Real Time kW Usage" setting to "5" and the maximum on the dial will be 5kW instead of 12kW. If you have a large facility, you may need to change it to 800kW to keep the needle from pegging. Any of the scales can be changed from the Dashboard by pressing the +/- buttons. The 'STEP' number is the incremental value changed for each field when the +/- button is pressed.

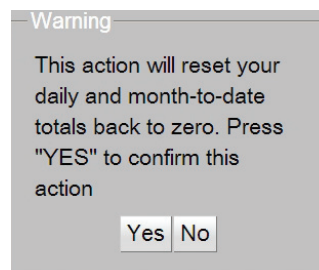
For **Solar** installations *only*, make this number a **NEGATIVE** number equal to the size of the PV system. In other words, if you have a 7kW system, you should make this a -7.

	Min	Max	Step
Time kW	0	630	10
Midnight	0	3000	100
ate kWh	0	20000	1000
ect kWh	0	200000	1000
age kWh	0	10000	100
me Cost	0	42	1
Cost Since Midnight	0	240	50
Month to Date Cost	0	4000	50
Project Cost	0	20000	50
Average Cost	0	400	1
Voltage	100	434	1

Field	Min	Max	Step
Real Time kW	-140	780	10
Real Time Cost	0	4	1
Voltage	100	280	1

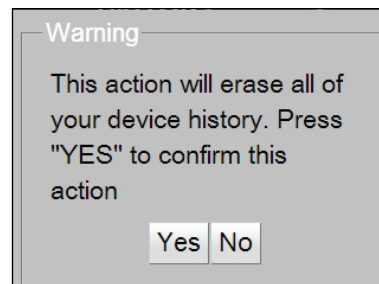
Reset Totals to Zero

Select this function to reset all of your totals to zero. This is a non-recoverable act, so you may want to consider Exporting your data prior to executing this function.



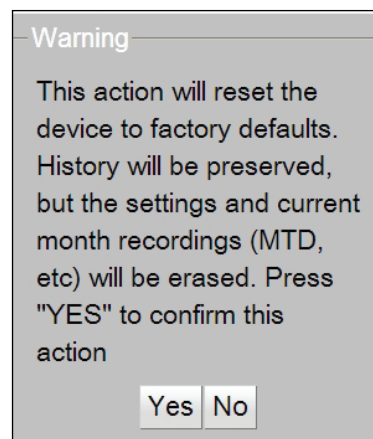
Erase History

Select this function to erase your entire history. This is a non-recoverable act, so you may want to consider Exporting your data prior to executing this function.



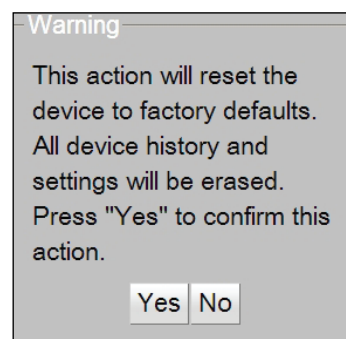
Reset to Factory Default

Select this function to reset all the data within TED. The will clear **ALL** charts, graphs, and all operational variables (time, date, rates, meter date, etc.) It will NOT erase History. This is a non-recoverable act, so you may want to consider Exporting your data prior to executing this function.



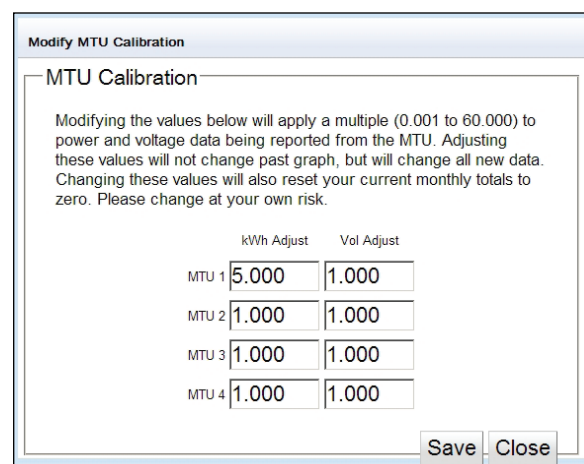
Reset to Factory Default and Erase History

Select this function to reset all the data within TED. The will clear **ALL** history, charts, graphs, and all operational variables (time, date, rates, meter date, etc.) This is a non-recoverable act, so you may want to consider Exporting your data prior to executing this function.



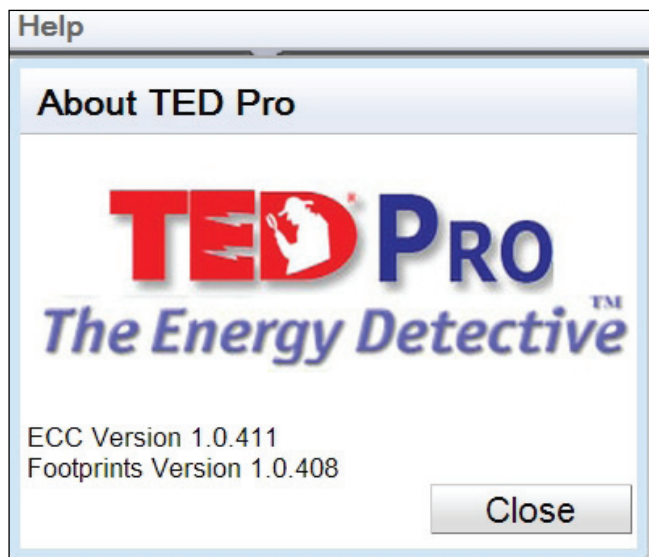
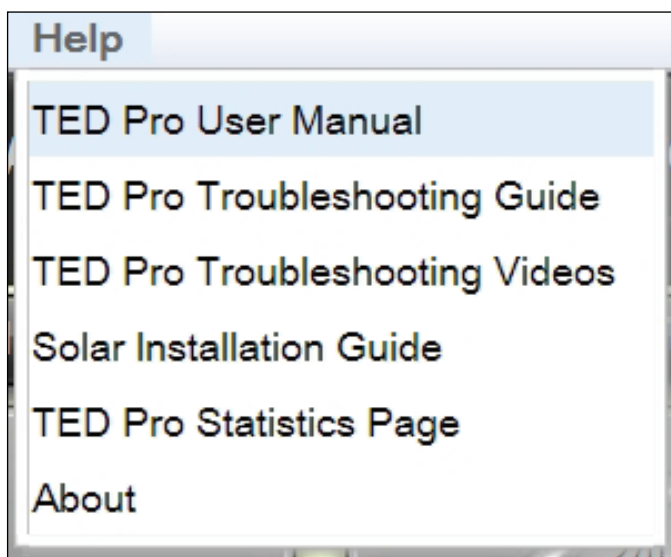
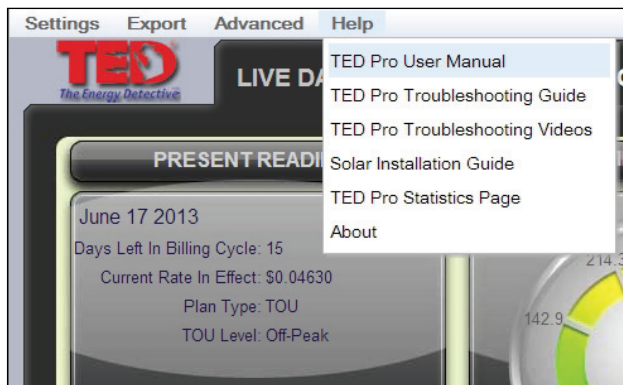
Modify MTU Calibration

Your TED comes calibrated from the factory. Most installations do NOT require any changes to the default settings. The default multiplier is **1:1**. If, after a 2-3 MONTH period, you feel TED is not matching your utility meter exactly, you can modify this multiplier to make TED more closely match your utility meter. You can adjust both the kW as well as the Voltage multiplier.



HELP Tab

Selecting any of the items shown under the HELP tab will open a link to download a file. You can choose to either view the files on your browser window, or you can save them to your computer.



HELP - ABOUT will display the version of firmware your system is operating under. This may be useful information if you ever need support.

TED Pro Statistics Page

This will open up a diagnostics screen. The most meaningful items (to the user) on the screen are the “MTU Rec” and “MTU Skp” shown below. These indicate *Received* data-packets and *Skipped* data-packets. If the Skipped is 20% or less than the Received, your system is in great shape. (divide MTU Skp by MTU Rec). In the example below: 64 divided by 108929 = 0.0005 (or 0.05%). The PLC in your TED system is extremely robust, so you likely will have no problems whatsoever.

If your MTU Skp ratio is higher than 20%, we would suggest you visit the following link:

<http://www.theenergydetective.com/PLC>

ECC Placeholder Page

	MTU 1	MTU 2	MTU 3	MTU 4
Active Power (W):	172855	86484	714	36333
Voltage (0.1V):	2845	2857	2839	2850
Current (0.1A):	2165 1930 2570	1085 1168 1169	15 0 15	609 683 662
Apparent Power (VA):	192530	100158	902	54686
MTU Rec:	108929	108906	108904	108899
MTU Skp:	64	87	88	93
Min Count:	7264	7262	7261	7262
Man Cal:	5000/1000	1000/1000	1000/1000	1000/1000
Last Timestamp:	1371676320	1371676320	1371676320	1371676380
Last Value (0.0001 WH):	219389527	1582936790	354569	702257573
PF Avg (0.1%):	897	863	550	659
MTU Id:	130ABF	130581	13057B	130100
Phase Type:	0	0	0	0
Use TCP:	1	1	1	1
Version:	405	405	405	405
Uptime:	437619	437096	436931	436778

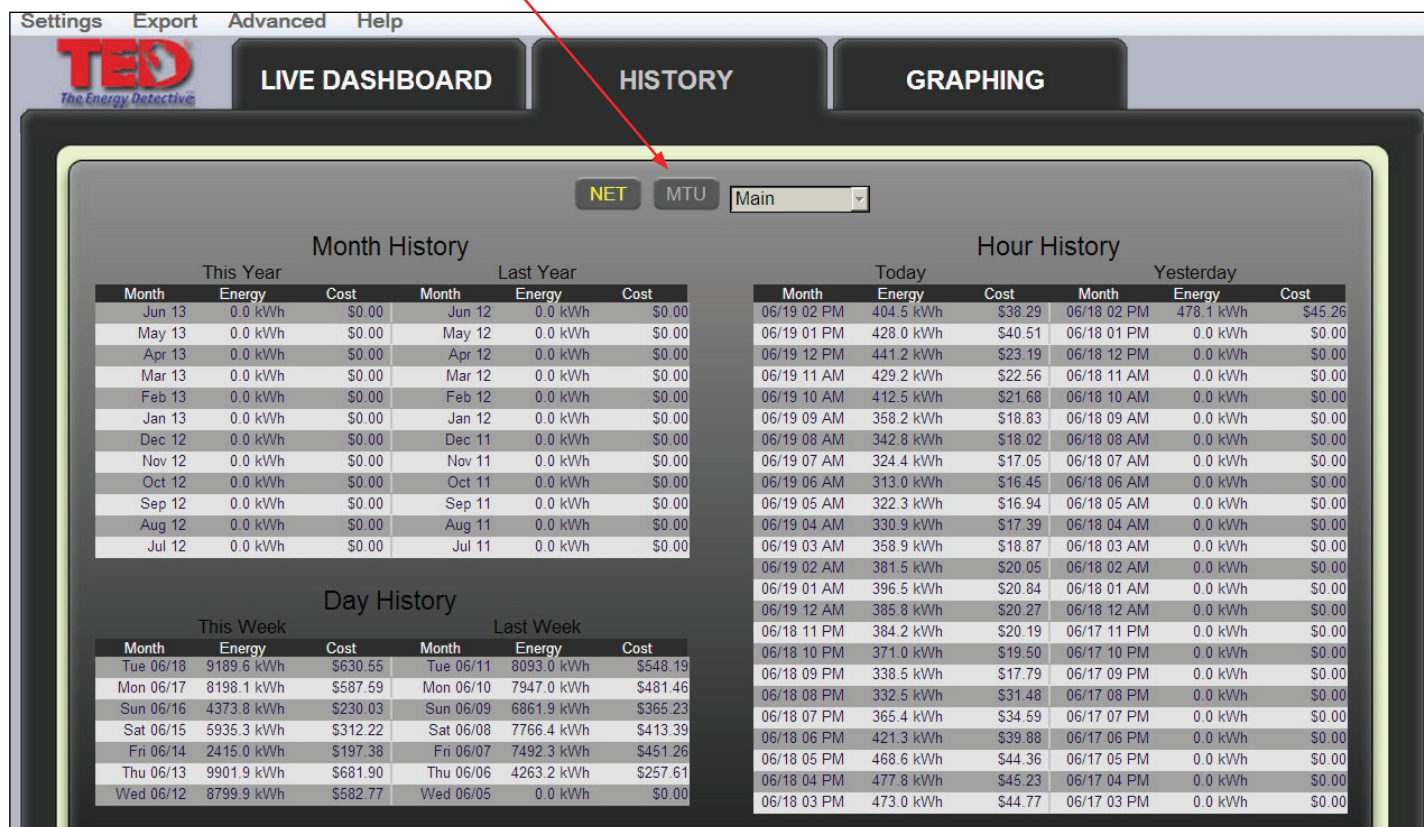
3rd Party Post

Activated	Act. Status	Attempts	Success	Result	Last Timestamp
0	0	0	0	0	0
Server	:0				
URI					

HISTORY

Use this History Chart to compare your usage with prior time periods. The data auto-populates. Compare Hours, Days, and Months.

To see historical data for separate MTUs, simply click the desired MTU as shown below.

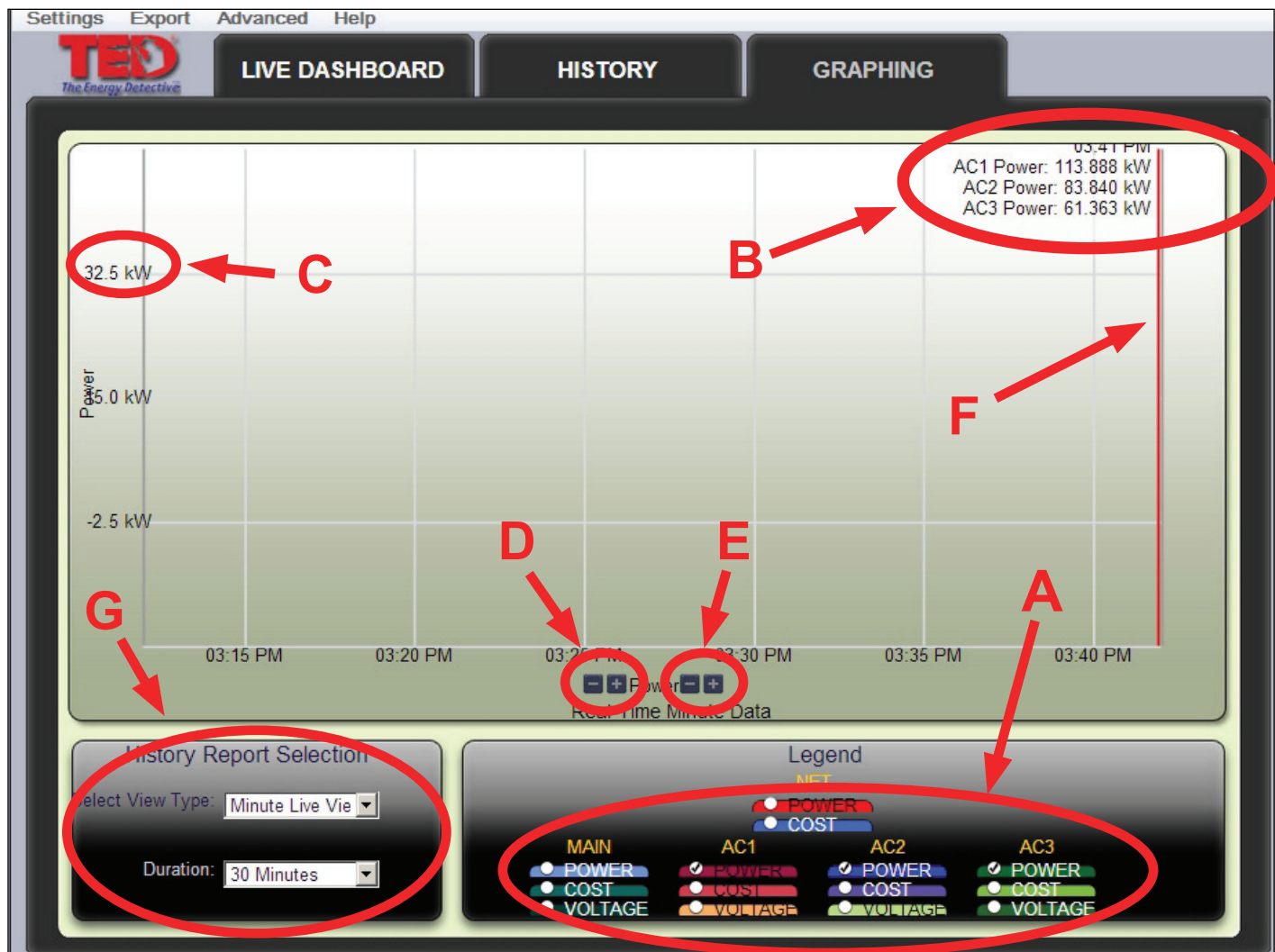


GRAPHING

The graphing library on your TED Pro is very flexible. If you look at the image below, you would be wondering “where is the graph?!” You may need to alter the scale of the graph (see D & E below) so that the graph appears. NOTE: Graphing is BROWSER-specific...so if you modify it on your desktop computer, you will need to do the same on other computers you wish to see the graphs.

Looking at the image below:

- A** These indicate the data points that will graph when you check the CHECKBOXES. You can also change the COLOR of the graphed lines by clicking on the background color (for example, under “Main” the background color of “Power” is a light blue...you would click the light blue area and a color chart appears)
- B** This is the value of the details that were checked under Item A, at a specific point in time.
- C** This indicates the upper value of the Y-Axis of the graph.
- D** These +/- buttons change the LOWER value of the Y-Axis. These buttons function independently of the upper value buttons (in Item E below)
- E** These +/- buttons change the UPPER value of the Y-Axis. These buttons function independently of the upper value buttons. Press the + until you begin to see your graph appear (it was simply out of range in the image below).
- F** Once your graph appears, you can move this vertical red line (with your mouse) along the graphed bar and note the value-change in “B” as you move along the graph.
- G** Graph Seconds, Minutes, Hours, Day, etc. for any period by selecting appropriate drop-down.



GRAPHING (cont'd)

TED Pro stores data internally in its ECC. This data can be retrieved at any time and graphed displayed in graphic form. The data available for viewing is:

SECONDS - one hour of second-data in increments from Live (real-time) recording, 30-seconds, or 1, 2, 5, 15, 30 and 60 minutes.

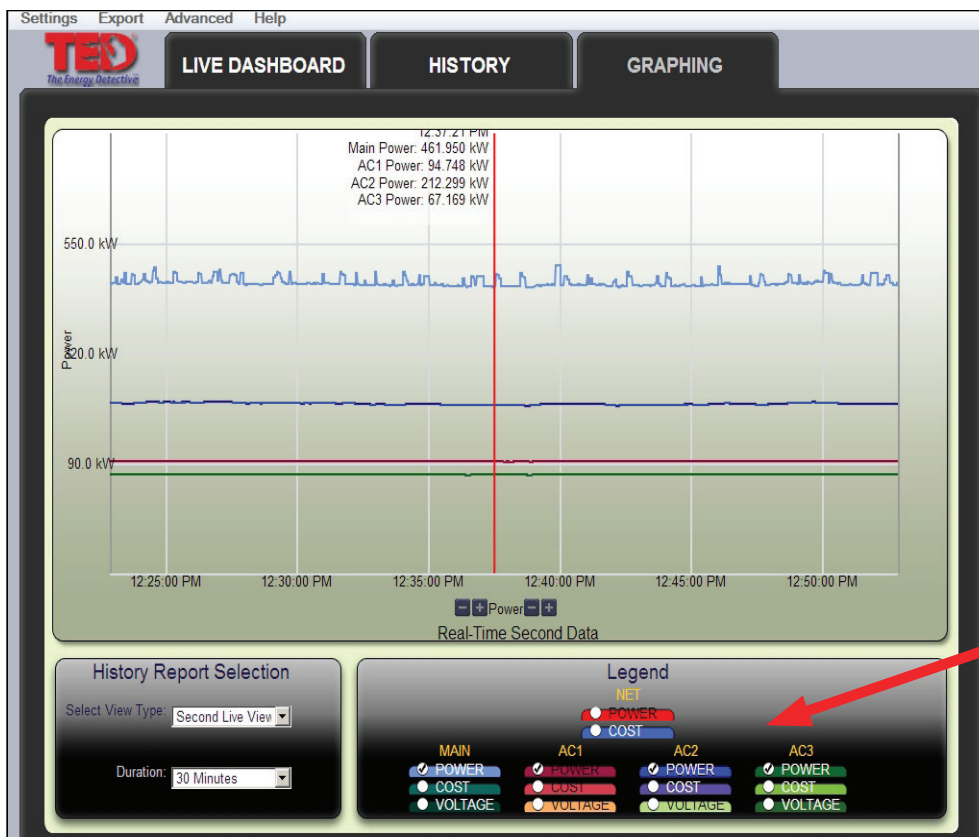
MINUTES - 48 hours of minute-data may be displayed in increments from 30 minutes; 1, 2, 4, 12, 24, 36, to 48 hours.

HOURLY - 90 days of hourly data are stored. Historical Hourly Data is viewable for any selected date-range in increments of 7-day periods. Specific Hourly Data can be viewed in kWh, Voltage, or Dollars.

DAILY - 2 years of Daily data are stored. Daily Data is viewable for any selected range for the prior 2 years in 90-day periods. Data viewable is: kWh, Dollars, Minimum/Maximum Voltage, Minimum/Maximum Cost, Minimum/Maximum Power (kW).

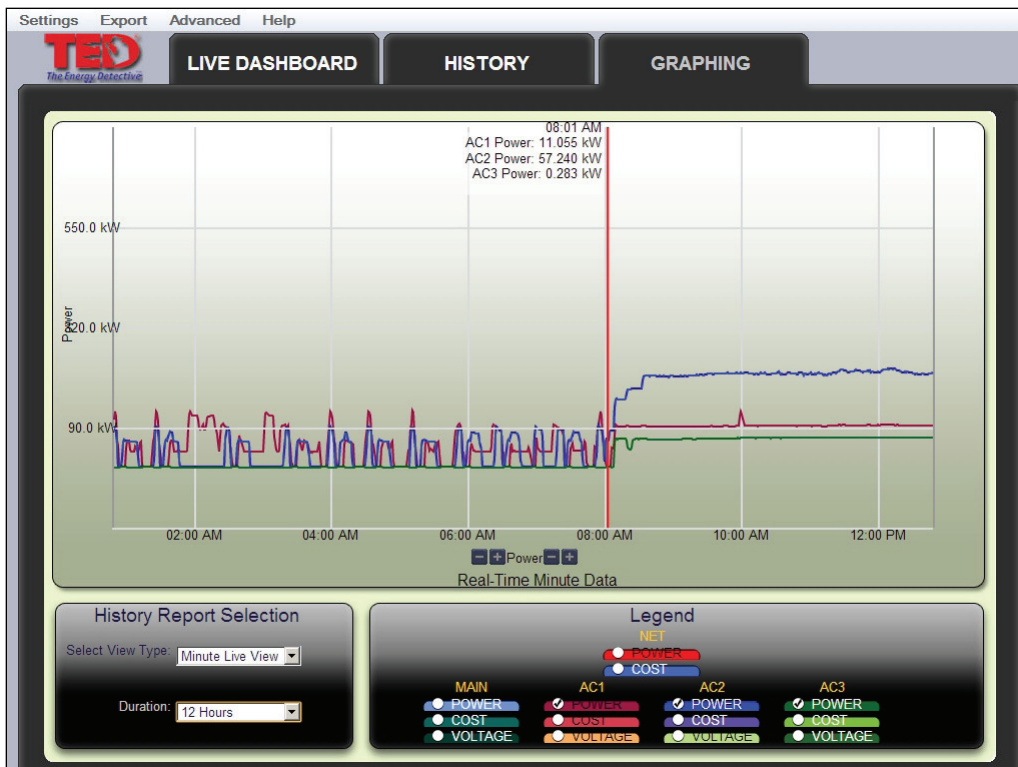
MONTHLY - 10 years of Monthly data are stored. Data viewable is: kWh, Dollars, Minimum/Maximum Voltage, Minimum/Maximum Cost, Minimum/Maximum Power (kW).

Sample - SECONDS graph of kW - scale selected is 30 seconds



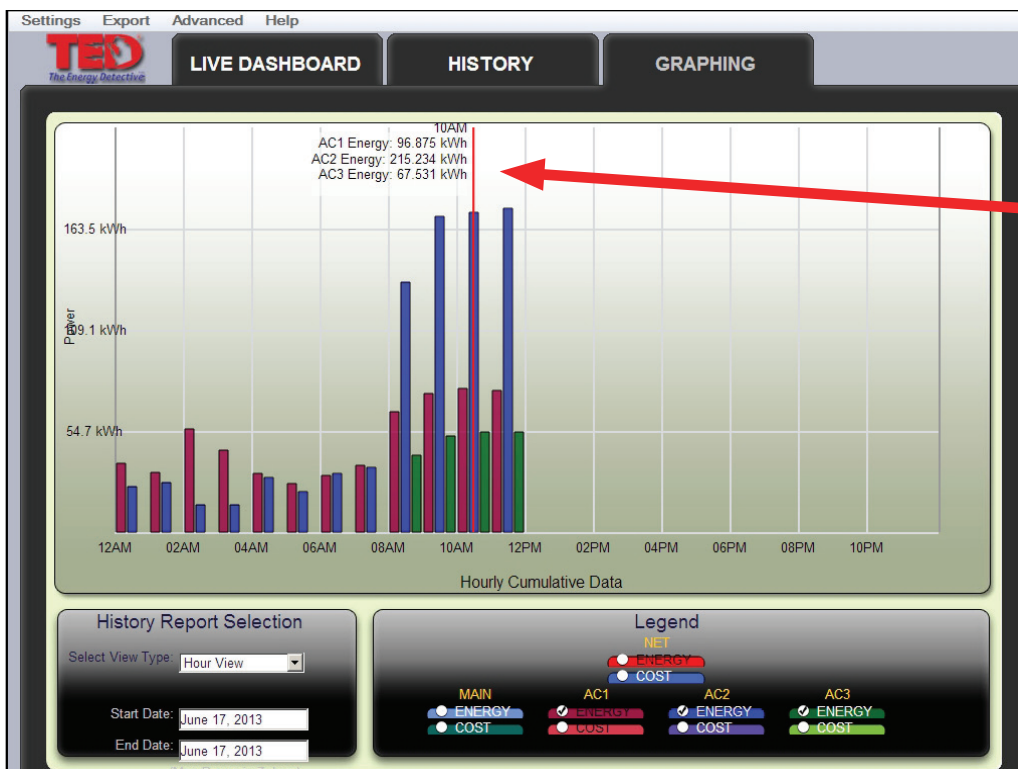
If more than 1 MTU is installed, each MTU may be graphed simply by checking the box under the name of the MTU.

Sample - MINUTE graph of kW- scale selected is 12 Hours



Looking at the graph, you can immediately see when the HVAC is on, when activity begins (office opens), etc.

Sample - HOUR graph of kWh



Hovering over any point on any graph will give the specific detail of that moment in time.

Solar/Wind Generation

If you are generating power (solar/wind, or auxiliary generator), TED will record your *Generation*, *Consumption*, and record the *Net* of the two as well. At any time, you can see each independently simply by checking the appropriate tab on the Live Dashboard (MTU1, MTU2, NET).

This section is to be completed only after the physical installation of the MTU(s) and CT(s) have been completed.

Your TED system can have up to 4 MTUs. One (or more) MTU(s) will be measuring your Consumption (Load), and the second (other) MTU will be measuring your Production (Generation). Footprints will record each of these, and also present the NET of your Production/Consumption. You may also have an MTU monitoring your HVAC unit (you will want this MTU to be set to STAND ALONE). Setting the MTU to “Stand Alone” tells the system not to count it twice in the overall load.

Under SETTINGS, select System Settings Wizard

- Select the tab System Layout
- Under “How Many MTUs?”, click the drop-down and select how many you have installed.
- Under “Multiple MTU Configuration,” select “SOLAR” if you have installed a Generating system.

Only after you have completed the Setup of your system will the changes be noted on the Live Dashboard.

By selecting “NET”, you will see a combined view of both/all of your MTUs...showing you a positive number if your consumption is greater than your generation, or a negative view if you are generating more electricity than you are consuming (sending electricity back to the grid).

You can view MTU1, MTU2, (MTU3 & MTU4 - if you have that many installed) all independently simply by selecting the appropriate MTU on the Dashboard, History, or Graph.

If your system has a wired Display, use the front button to select the NET, GEN, and LOAD screen.

APPENDIX A

Connecting TED Pro ECC Directly to a Computer

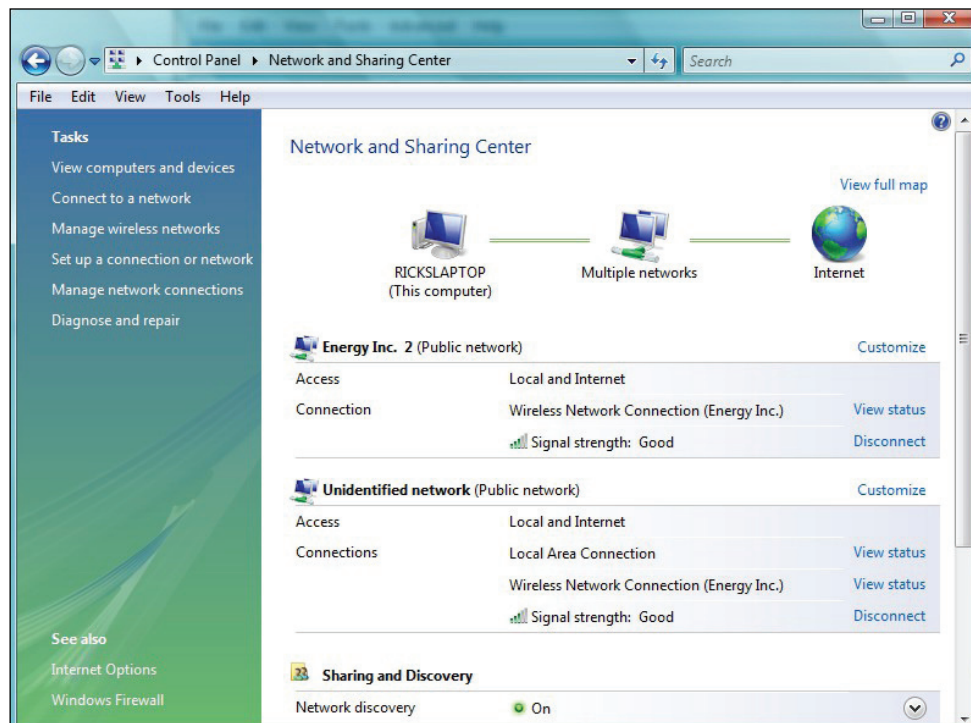
Note: It is highly recommended that you connect your ECC directly to your router, *and not your computer*.

- Installation and setup is simplified.
- Energy information can be viewed by any device connected on your home network.
- Time is automatically synchronized.
- Up to the minute weather information is available.

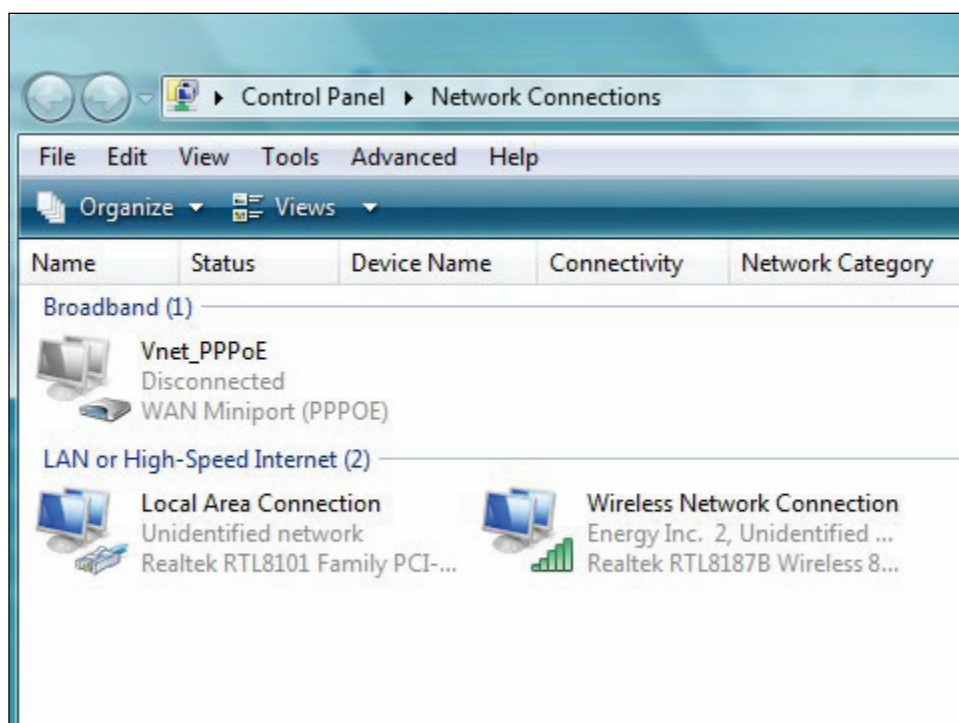
If you do not have a router, we highly recommend that you purchase one.

To connect your ECC directly to your computer, you will most likely need to change the network settings on your computer. Please carefully follow these steps:

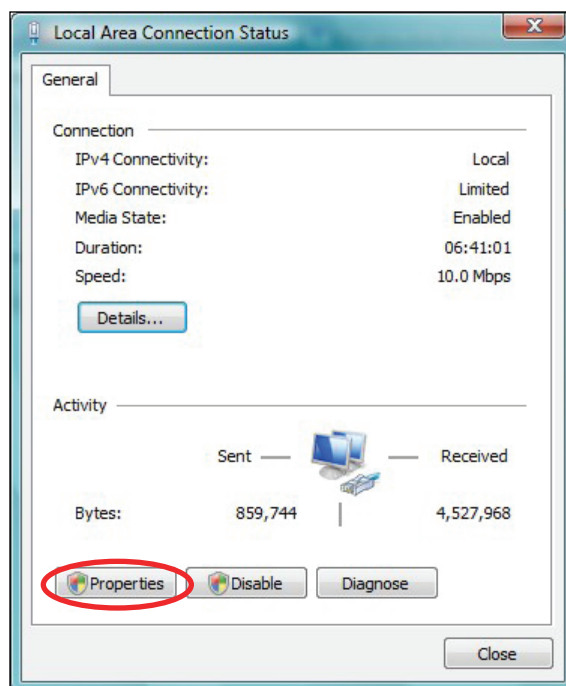
1. Plug the ECC into a 120V outlet.
2. Connect your PC to the ECC with the included Ethernet Patch Cable.
 - 2.1. If you need a longer cable, any CAT V cable with RJ45 jacks may be used.
 - 2.2. A cross-over cable can be used to direct-connect to the computer, but it is not necessary. The ECC automatically senses the cable configuration.
3. Open your web browser (Internet Explorer, Firefox, Chrome, etc.)
 - 3.1. In the address bar type in: <http://192.168.7.4/Footprints.html>
 - 3.2. FootPrints Pro Dashboard should load (Note: could take up to 1 ½ minutes to load)
4. If you get a “Cannot Open Webpage” or “File Not Found” error on your browser, then you will need to change the IP of your PC.
 - 4.1. Go to Control Panel/Network and Sharing Center (accessed from Start Menu)
 - 4.2. Click on Manage Network Connections.



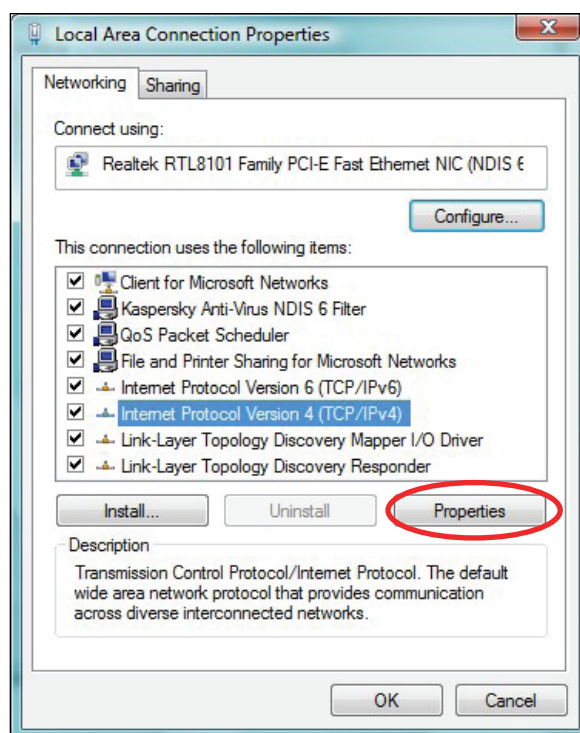
4.3. Click on Local Area Connection



4.4. Click on Properties

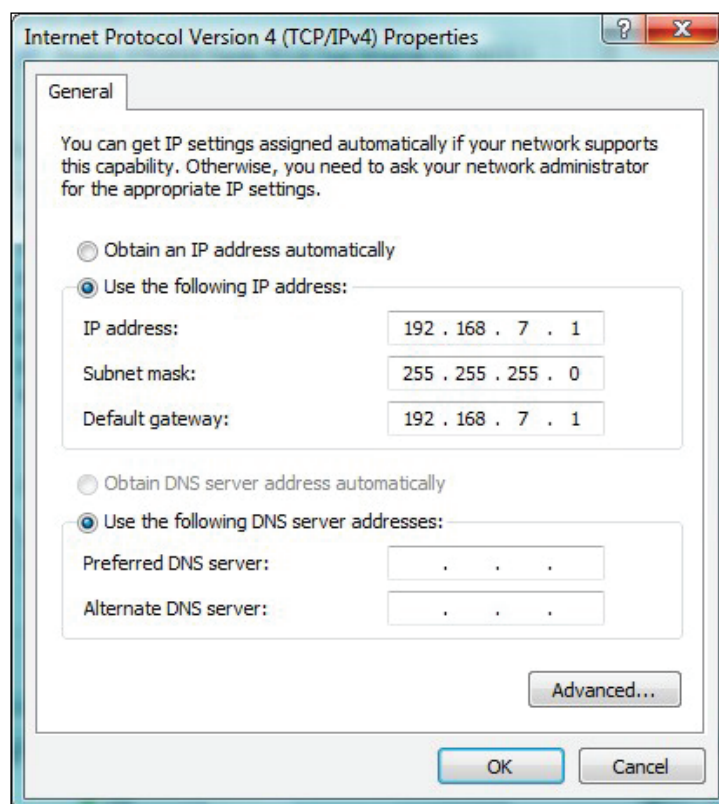


4.5. Highlight Internet Protocol Version 4 (TCP/IPv4). Click on “Properties”



4.6. Click “Use the following IP address” and fill in as shown:

- 4.6.1. IP Address 192.168.7.1
- 4.6.2. Subnet mask: 255.255.255.0
- 4.6.3. Default ECC: 192.168.7.1



4.7. Click OK

4.8. Restart your browser and type: <http://192.168.7.4/Footprints.html> into the address bar.



4.9. Footprints Pro Dashboard should be displayed

4.9.1. Read and follow Footprints Pro Help File.

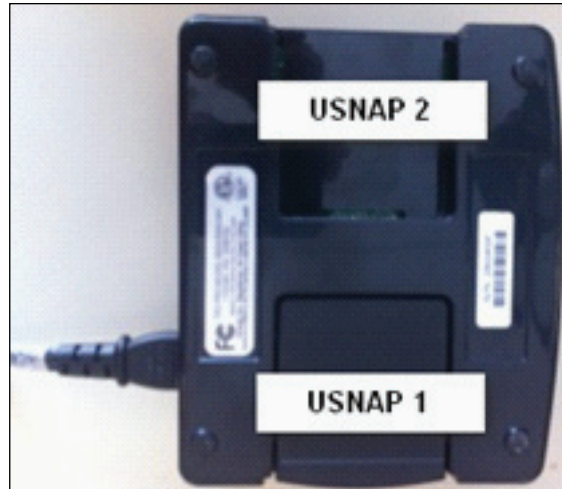
4.9.2. If Footprints Pro does not come up, please contact your network administrator, IT department or trained computer professional.

TED can not help you troubleshoot network issues.

APPENDIX B

USNAP Devices

With the power cord unplugged from the wall outlet, turn over the ECC and slide in the USNAP card until it seats firmly. If you have any trouble seating a USNAP device, the second port can be used - **do not force the card**. The ports are identified as USNAP 1 on the side of the AC power cord and USNAP 2 on the side of the Ethernet connection as shown below. The selected port will need to be identified in System Setting/ System Layout.



APPENDIX C

Wired Display

If your system has a Wired Display, connect it to the ECC with the USB3 cable provided as shown below.



TED Glossary of Terms

The following terms are used throughout the TED documentation. The explanations/ definitions provided are presented in context with your TED system. There is much more comprehensive information available on the web.

Amperage – (Amps) The *strength* of an electrical current. Amps = watts ÷ volts

Apparent Power – Voltage * Current. Expressed in VA or kVA, it is similar to Power (P), but does not take into account the phase shifts that occur in an AC circuit. This phase shift is called the power factor (PF).

Billing Cycle - The time period used by the Electric Utility to calculate your bill. TED begins and ends its calculations based on the Billing Cycle. TED will automatically reset at midnight on the Meter Read Date (the beginning/end of the Bill Cycle). The Default date is the 1st of the month.

CT - (Current Transformer) Electric current in a wire or cable creates a magnetic field. The CT senses this magnetic field and produces a proportional electrical AC output that is sent to the MTU (see MTU below). There are 2 basic types of CTs: Solid Core (or donut) and Split-Core. The TED MTU uses Split-Core, as they are easier to install over large cables

Current – The flow of electrons through a conductor. Represented by “I” in electrical formulas.
Power (P) = Current (I) x Voltage (V). The CTs, which are connected to the MTU, measure the current.

ECC - (Energy Control Center) Serves as the “hub,” or brain center of a TED Pro or TED Pro Home system. It receives data from the MTU every second and can do all the following: present data on an optional hard-wired Display, transmit the data wirelessly to a Display, present the data in any web browser or mobile device, present the data on any local computer, post data to a remote server, and store up to 10 years of detailed data. It has an Ethernet port, a USB port, and two USNAP ports that allow for development with any number of communication protocols (ZigBee, wifi, etc).

Energy – Electrical energy is the measurement of electrical power over time. Power is expressed in watts (W) or kilowatts (kW), so electrical energy is expressed in kilowatt-hours (kWh). This is what you use, and what your utility charges you for each month.

kVA – kilovolt-ampere. 1000 x Voltage x Current (Amps). kVA is the unit used for expressing apparent power.

kW - kilowatt. A unit used for expressing power. Power is also expressed in watts (W), so 1000 watts = 1 kilowatt (the equivalent of ten 100-watt light bulbs burning for an hour). The TED Footprints real-Time Dial displays power in kilowatts.

kWh – kilowatt-hours. 1000 watt-hours. A unit used to express Energy. This is the measurement used by the utility when they bill you each month. It is how much energy you consumed during the billing cycle.

MTU - (Measuring Transmitting Unit) TED device that is installed in the electrical panel. The MTU takes thousands of voltage and current measurements over the course of a second to determine instantaneous power, and records the accumulation of energy. Every one second, it sends the data to the Gateway or ECC (depending on TED model).

PLC - (Power Line Carrier) There are many ways to transmit data: radio signals, Cat-5 (Ethernet) cable, Power Line Carrier are a few. Power Line Carrier is a protocol which transmits data over the existing power lines in a building. It is extremely reliable for continual, rapid transmission of data. TED uses a very robust PLC technology that has proven very reliable in the harshest environments.

Power – Expressed in Watts (W) or kilowatts (kW), power is the measure of the instantaneous rate at which energy is transferred. $\text{Power (P)} = \text{Voltage (V)} \times \text{Current (I)}$. The Real-Time dial in TED Footprints displays the power, and is updated every second.

Power Factor - Usually expressed as a decimal or percentage, power factor is a measure of the phase shift that occurs in ac circuits due to what is called reactance of inductive loads, (such as a motor or compressor). The basic effect of this is that more current is required to accomplish the same amount of work. $\text{Power factor (PF)} = \text{active power (expressed in kW)} / \text{apparent power (expressed in kVA)}$. Power Factor is an indication of the efficient use of electricity. If you have a low PF (typically any measurement below 90%), you are not making good use of the electricity you are consuming. The higher the Power Factor, the better.

Tariff – The rate that the utility charges for energy. There are many, many ways that utilities charge. TED has been designed to easily accommodate almost any tariff structure – whether they are flat rates, tiered, time-of-use, tiered within time-of-use, demand, seasonal, and/or any mix of them.

Voltage – The measure of potential electrical energy between two points. $\text{Power (P)} = \text{voltage (V)} \times \text{current (I)}$. The MTU power cable is wired into the breaker to measure the voltage. The TED system does measure true voltage. If TED did not measure voltage, it would not be accurate at all.

Watt - The standard unit of power. The formula to calculate watt: $\text{Watt} = \text{Voltage} \times \text{Amps}$