



# **TOBI PI Wi-Z AND POWER LOGGER Wi-Z SOFTWARE USER GUIDE**

**TOBi™ Wi-Z**

**TOBi™ Reports**

**Version 2.xx**



# TOBi™ PI Wi-Z Performance Indicator and Event Logger User Guide

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## Section 1: Introduction

### 1.1 Safety Instructions

#### **WARNING**

**BATTERIES CONTAIN LETHAL VOLTAGE LEVELS. INSTALLATION AND SERVICING MUST BE PERFORMED BY QUALIFIED PERSONNEL.**

**IMPORTANT: SAVE THESE INSTRUCTIONS!**  
READ AND FOLLOW ALL INSTRUCTIONS BEFORE INSTALLING, OPERATING, OR SERVICING DEVICE. ANY DEVIATION CAN CAUSE SERIOUS AND PERMANENT DAMAGE. FAILURE TO FOLLOW THE INSTRUCTIONS WILL VOID THE WARRANTY.

Do not touch un-insulated parts of the output connector or battery terminals. A possibility of serious electrical shock exists.

Never smoke, use an open flame, or create sparks in the vicinity of the battery. Ventilate well when the battery is in an enclosed space.

Lead-acid batteries contain sulfuric acid, which is caustic and can cause chemical burns to the skin. Refer to the battery manufacturer's instructions for safe handling of batteries. Use proper personal protective equipment. Do not get in eyes, on skin, or on clothing. In cases of contact with eyes, flush immediately with clean water for 15 minutes. Seek medical attention immediately.

Care should be observed when using tools on or around the battery to avoid shorting the battery. Do not lay tools on top of the battery.

## Section 1: Introduction

### 1.2 Purpose

TOBi PI Wi-Z and POWER LOGGER Wi-Z are battery performance indicators and event loggers which are installed on an industrial battery and require no user interaction for proper operation. TOBi PI Wi-Z and POWER LOGGER Wi-Z monitor and store key parameters associated with the battery operation.

TOBi PI WI-Z and POWER LOGGER Wi-Z can function as stand-alone diagnostic devices and can store up to 4000 unique battery events in the onboard memory. Once the onboard memory is full, events will begin overwriting from oldest to newest until uploaded by the user.

TOBi PI WI-Z and POWER LOGGER Wi-Z events can be uploaded to a laptop by using TOBi Wi-Z software. Once uploaded, events can be viewed, charted and reported on by using TOBi Reports software.

Aside from the functions described above, TOBi PI Wi-Z can interface with any Ferro Magnetics charger equipped with a TOBi Charge Control (Ferro Magnetics part number 046-0272). The charge control and TOBi PI Wi-Z will exchange information prior to and during the charging cycle to directly impact the performance of the battery charger. The POWER LOGGER Wi-Z does not have this feature.

TOBi PI Wi-Z is uniquely configured to read two battery voltage points simultaneously. This allows a much more accurate means to monitor cell problems within the battery, by comparing the two voltages. Reading just the entire battery voltage can miss cell

## Section 1: Introduction

problems on batteries with a high number of cells due to the resolution of one cell's voltage as compared to the entire battery's voltage. The POWER LOGGER Wi-Z plugs directly into the battery connector and only reads the full battery voltage.

### 1.3 Description

The TOBi PI Wi-Z is approximately 1.6 x 3.6 x 1 inches in dimension and has three wires that connect to the battery (positive, negative, and 12V). It also has a water level/temperature probe that is inserted in one of the cells to accurately read the electrolyte level and battery temperature and a current sensor that is attached to the negative battery cable. It can be mounted at any convenient location on the battery. The Tobi PI Wi-Z has an LED indicator that will blink green when the water level is OK and blink red when the water level is low. It has an LED indicator that will blink green when the battery temperature is below the OK to charge temperature and will blink red when the temperature is above the OK to charge temperature.

The POWER LOGGER Wi-Z is approximately 4.3 x 3.2 x 1.6 inches in dimension and has SB350 connectors on either end to connect directly to the battery and the charger/truck. The POWER LOGGER Wi-Z has an LED indicator that will blink to indicate power.

Both the TOBi PI Wi-Z and POWER LOGGER Wi-Z are universal in design and will accept a wide range of input voltages, from 12 to 80 volt batteries.

## Section 1: Introduction

### 1.4 Operation

TOBi PI Wi-Z and POWER LOGGER Wi-Z require no operator or user interaction for the unit to properly function. The most current 4000 battery events are monitored and stored onboard.

When powered, the Tobi PI Wi-Z will display blinking LEDs which are labeled 'WATER LEVEL' and 'TEMPERATURE' on the front. The POWER LOGGER Wi-Z has a single blinking LED which is labeled 'POWER' on the front.

The TOBi PI Wi-Z and POWER LOGGER Wi-Z are capable of transferring information from the memory to a laptop or PC via a wireless communications protocol.

If a battery is plugged into a Ferro Magnetics battery charger equipped with the TOBi Charge Control (Ferro Magnetics P/N: 046-0272) configured for communication with the TOBi PI Wi-Z the TOBi PI and charger will communicate at the beginning and during the battery charge.

## Section 2: Software Overview

### 2.1 Software Overview

The TOBi PI Wi-Z Software Suite contains two separate components used to interface with the TOBi PI Wi-Z or POWER LOGGER Wi-Z.

TOBi Wi-Z software allows for direct communication via a compatible wireless device. This direct communication mode can be used to:

1. Monitor the current state of the battery
2. Configure the key battery identification information
3. Calibrate the current sensor
4. Upload events to a laptop computer

TOBi Reports software is used to access, view, graph and report on the battery events once they have been uploaded to a PC.

### 2.2 System Requirements

#### 2.2.1 TOBi PI Wi-Z Software Suite System Requirements:

1. A PC with at least a Pentium III or Celeron processor with 600 MHz
2. Windows ® XP, Vista, 7 or 8 operating system.
3. A minimum of 256 MB of RAM is required (1G recommended)
4. A display resolution of 1024x768
5. A minimum of 250 MB hard drive space
6. A CD-ROM drive or Internet access (refer to section 2.3)
7. A USB port



## Section 2: Software Overview

### 2.2.2 TOBi Wi-Z System Requirements

In addition to the above, TOBi Wi-Z requires a TOBi PI Wi-Z coordinator (Ferro Magnetics p/n 038-465) for communication with the wireless network of TOBi PI Wi-Z or POWER LOGGER WI-Z devices. The coordinator is a USB-to-wireless adapter. Optionally, TOBi PI Wi-Z wireless routers (Ferro Magnetics p/n 038-466) can be installed to extend the range of the wireless network.

### 2.3 Software Installation

All components of the TOBi PI Wi-Z software suite will be installed automatically by default.

Note: If no CD-ROM drive is available, contact Ferro Magnetics for information on downloading the latest software version (see appendix B).

To install the software suite, insert the installation CD in the computer CD-ROM drive. If the installation does not start automatically, double click the Install.bat file located on the CD. Follow the instructions given by the installer to install the USB drivers and the applications. When the installation is complete, you will be prompted to register the software to receive information about product updates.

After the installation, you will see TOBi Wi-Z and TOBi Reports icons on your desktop.

## Section 2: Software Overview

### 2.4 Launching the software

TOBi Wi-Z or TOBi Reports software can be started from your Windows® desktop by double-clicking the associated icon. Should the need arise to create a new icon for either, the program files are located in the C:\Program Files\Ferro Magnetics Applications folder on your hard drive.

## Section 3: TOBi Wi-Z Software

### 3.1 Introduction

The TOBi Wi-Z software is used to communicate with the TOBi PI Wi-Z or POWER LOGGER Wi-Z for the purpose of configuring parameters and retrieving information. Additionally, the TOBi PI Wi-Z can store standard or custom charge algorithms used by the Ferro Magnetics Controlled Ferro or High Frequency line of industrial battery chargers.

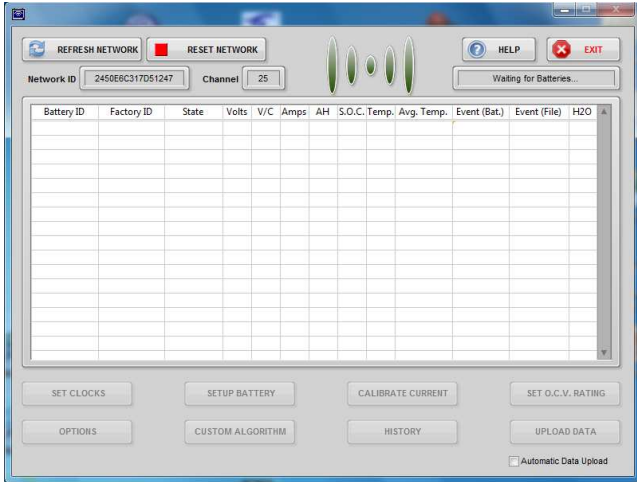
*This section assumes that all software, drivers and the TOBi PI Wi-Z or POWER LOGGER Wi-Z have been installed as detailed in the previous sections of the manual and the hardware installation guide.*

### 3.2 TOBi Wi-Z software environment

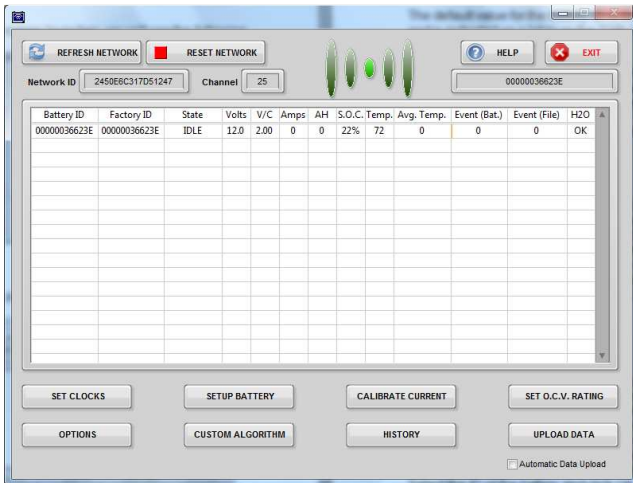
Make sure the USB wireless coordinator is connected to a USB port. Launch the TOBi Wi-Z software by double-clicking the associated icon on your desktop.

### Section 3: TOBi Wi-Z Software

When the program launches, you will see the following screen:



As devices join the network, they will appear in the list:



## Section 3: TOBi Wi-Z Software

The default value for the battery ID is the factory ID and is indicated on a label on the TOBi PI Wi-Z or POWER LOGGER Wi-Z.

**Note: If you are installing more than one TOBi PI Wi-Z at a time, before assigning the ID make sure to write this number down along with the corresponding ID you wish to assign to the battery. This will ensure you can identify the battery when it joins the network for the first time.**

### 3.2.1 SET CLOCKS

The SET CLOCKS button is used to set the time and date on one or all batteries in the wireless network. To set the clocks, click on SET CLOCKS. A dialog will appear asking for the battery ID. Select the battery ID or select ALL to set the clock on all devices and click OK. A message will appear to verify the time and date setting. The PC clock setting is used. If this is correct, click OK.

### 3.2.2 SETUP BATTERY

The SETUP BATTERY button is used to enter information about the battery. This information is saved in the TOBi PI Wi-Z or POWER LOGGER Wi-Z and then uploaded and saved to the battery event file during event upload. To enter the battery information, click on SETUP BATTERY. If more than one battery is in the network, a dialog will appear asking for the battery ID. Select the ID of the battery and click OK. Input the model number, serial number, ID, voltage rating, and AH rating for the battery and click SAVE when completed. The information will be saved and

## Section 3: TOBi Wi-Z Software

read back for verification. If all information is correct, click EXIT.

**Note: You must enter a value for voltage and AH rating for TOBi Reports to function properly. Failure to enter a value will diminish the quality of the reports created.**

### 3.2.3 CALIBRATE CURRENT

**Read this section completely before attempting to calibrate the current sensor.**

**Important: The current sensor must be calibrated after installation in order for the TOBi PI Wi-Z to function properly and record events accurately.**

**The POWER LOGGER Wi-Z is calibrated at the factory and should not need calibration. However, the accuracy of the current readings should be verified periodically and calibration performed as necessary.**

**Note: The current sensor must be calibrated at both a zero and a non-zero value.**

**Note: This step will require the use of battery charger with a reliable digital amperage display or a handheld current sensing probe.**

To calibrate the current sensor, click on CALIBRATE CURRENT. If more than one battery is in the network, a dialog will appear asking for the battery ID. Select the ID of the battery and click OK. A message will appear to verify that the battery is NOT connected to a charger or truck. Click OK if the battery is NOT

## Section 3: TOBi Wi-Z Software

connected to a charger or truck. The software will wait for an idle state and then automatically calibrate the zero value. A message will appear prompting to connect the battery to a charger or load. Click OK after you have connected the battery.

The software will wait for a charge or discharge state and then prompt for the current value. If the battery current is stable, enter the value shown on the charger or meter and click OK. The non-zero value will be calibrated and the value will be read back for verification. If the value matches the charger or meter, click OK. If not, click RECALIBRATE and repeat the non-zero calibration.

### 3.2.4 SET O.C.V. RATING (*optional*)

The SET O.C.V. RATING button is used to set the full charge open circuit voltage rating for the battery. This setting represents the voltage (or specific gravity) of the battery in a fully charged state. Refer to the manufacturer's specifications to determine the specific gravity rating for your battery. This setting can be adjusted to compensate for high gravity batteries or for aged batteries. If you are unsure of this rating, do not change the setting. To set the OCV rating, click on SET O.C.V. RATING. If more than one battery is in the network, a dialog will appear asking for the battery ID. Select the ID of the battery and click OK. A message will appear indicating the current setting for the battery. To change the setting, click on Change. Select the setting from the list and click OK.

### 3.2.5 OPTIONS (*optional*)

In most cases the parameters discussed in this section do not require changing for the TOBi PI Wi-Z or POWER LOGGER Wi-Z to operate properly. If however, you have been instructed by the factory or fully understand the parameters discussed in this section – you may alter the time delay settings which determine how and when events are recorded. Event state is determined by the direction of current flow into or out of the battery and the time of the event. Event timers control when the state change takes place based on the duration of the current flow. By default the following values used by TOBi PI Wi-Z and POWER LOGGER Wi-Z are 10 minutes for an idle event, 30 seconds for a charge event, and 5 seconds for a discharge event. For example, a battery taken out of service and placed on a charger will require 30 full seconds of current flow into the battery before the state is changed to charge. Likewise, when the charge is completed, 10 full minutes of no current is required before the state is changed to idle. The minimum current for battery not idle parameter represents the lowest current that will be detected. Any current below this value will read as 0. To change the event options, click on OPTIONS. If more than one battery is in the network, a dialog will appear asking for the battery ID. Select the ID of the battery and click OK. Enter the desired settings and click SAVE. The settings will be saved and read back for verification. If all information is correct, click EXIT.



### 3.2.6 CUSTOM ALGORITHM *(optional)(TOBi PI Wi-Z only)*

The TOBi PI Wi-Z can store a custom charge profile, or algorithm, that can be uploaded by a Ferro Magnetics charger that is equipped with a TOBi charge control (046-0272). Refer to your charger manual or the 046-0272 control setup instructions for information on how to set the charger to use the custom algorithm stored in the TOBi PI Wi-Z. To change the algorithm settings, click CUSTOM ALGORITHM. If more than one battery is in the network, a dialog will appear asking for the battery ID. Select the ID of the battery and click OK. The algorithm settings will be read from the TOBi PI Wi-Z and displayed. Changes can then be made to any of the algorithm parameters. To select one of the standard algorithms, click on the SELECT ALGORITHM drop-down list and select the algorithm to use. Changes can then be made to any of the settings. It is not recommended that changes be made to the standard algorithms provided unless instructed to do so by the battery manufacturer. Changing these parameters may have long-term effects on battery performance and improper settings can lead to reduced battery life. When all changes have been made, click UPDATE CHANGES. The settings will be saved to the TOBi PI Wi-Z. When you are done, click EXIT.

### 3.2.7 HISTORY

The HISTORY button is used to view or clear the current history. Clearing the history will reset the event counter and could cause conflicts for ongoing battery diagnostics. It is not recommended to clear the history on a TOBi PI Wi-Z unless you are moving the TOBi PI Wi-Z to a new battery and the ID is changed. The history should be cleared from the POWER LOGGER Wi-Z after each use so only new events are recorded. To view the history, click on HISTORY. If more than one battery is in the network, a dialog will appear asking for the battery ID. Select the ID of the battery and click OK. The history data will be read from the TOBi PI Wi-Z and displayed. To clear the history, click on CLEAR HISTORY. Note that the lifetime AH charged, lifetime AH discharged, lifetime max temperature, lifetime min temperature and lifetime average temperature data cannot be cleared.

### 3.2.8 UPLOAD EVENTS

Event upload can be done manually or automatically. To automatically upload events, check the box next to automatic event upload. If this box is checked, any batteries in the network that have fewer events on file than in the TOBi PI Wi-Z or POWER LOGGER Wi-Z will have the events uploaded. To manually upload events, click on UPLOAD EVENTS. If more than one battery is in the network, a dialog will appear asking for the battery ID. Select the ID of the battery and click OK. The battery information, lifetime data and events will then be uploaded and saved in a csv file.

## Section 3: TOBi Wi-Z Software

The name of this file will be the battery ID. Only events that are not already in the file will be uploaded. If the history is cleared and an event file exists for the battery ID, new events with the same event number will NOT overwrite old events.

### 3.2.9 REFRESH NETWORK

If TOBi PI Wi-Z or POWER LOGGER Wi-Z devices and or routers are not responding (not shown in the battery list), it may be necessary to refresh the network. This is caused by devices moving in and out of range of the coordinator or nearest router. The REFRESH NETWORK button will clear the battery list and scan the network for any TOBi PI Wi-Z or POWER LOGGER Wi-Z devices and routers that are already joined. The list will repopulate as they are found.

### 3.2.10 RESET NETWORK

If TOBi PI Wi-Z or POWER LOGGER Wi-Z devices and or routers are not responding (not shown in the battery list), it may be necessary to refresh the network. This is caused by devices moving in and out of range of the coordinator or nearest router. If the network refresh (section 3.2.9) does not result in all Tobi-PI Wi-Z or POWER LOGGER Wi-Z devices and routers appearing in the list, then a network reset may be necessary. The RESET NETWORK button will clear the battery list and close the current network. It will then scan for an open channel and create a new network. TOBi PI Wi-Z or POWER LOGGER Wi-Z devices and routers will be added to the list as they join the network.

## Section 4: TOBi Reports Software

### 4.1 Introduction

TOBi Reports provides a means to review and report on battery events that have been uploaded from the battery. The following reports and charts are available:

#### A. Reports

- Shift Summary (listing of AH Charged, AH Discharged, Charge Return, Discharge AH/hour, Charge Time, Discharge Time, Idle Time, Charge Cycles, EQ Charge Cycles, Max Charge Temp, Max Discharge Temp, Water Low Time, Minimum Discharge Volts, and Minimum SOC by shift.)
- Daily Charge Summary (listing of number of charge cycles, total charge time, and total AH by day.)
- Charge Cycles (listing of day/time, charge duration, AH, Max V, Max T, SOC, and H2O for each charge cycle.)
- Battery Utilization (listing of Discharge AH, Discharge Time, Discharge AH/H, Max Discharge Temp, Charge AH, Charge Time, Max Charge Temp, and Idle Time by day or by shift.)
- Battery Operation (listing of Discharge Time, Discharge % of Day, AH Discharged, % of Battery, Charge Time, Charge % of Day, AH Charged, Total % of Day in use, Charge Return %, Min Volts, Max Volts, Max Temp, and minimum SOC.)
- Throughput by Cycle (listing of AH discharged, % of battery rating, AH charged, and charge/discharge ratio by cycle.)
- Idle Time (listing of Start Time and Duration for up to 6 idle periods per shift for up to 3 shifts.)
- Battery Events List.

## Section 4: TOBi Reports Software

### B. Charts

- Battery SOC
- Battery Throughput
- Parameter Charts
  1. Amp Hours
  2. Max Temperature
  3. Min Temperature
  4. Max Volts
  5. Min Volts
  6. Max Amps
  7. Max Delta Volts

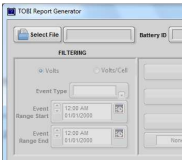
### 4.2 Creating a Report

Reports are designed for summarizing the most critical and often used information when performing battery, charger, or vehicle diagnostics or comparison.

## Section 4: TOBi Reports Software

### 4.2.1 To create a Report:

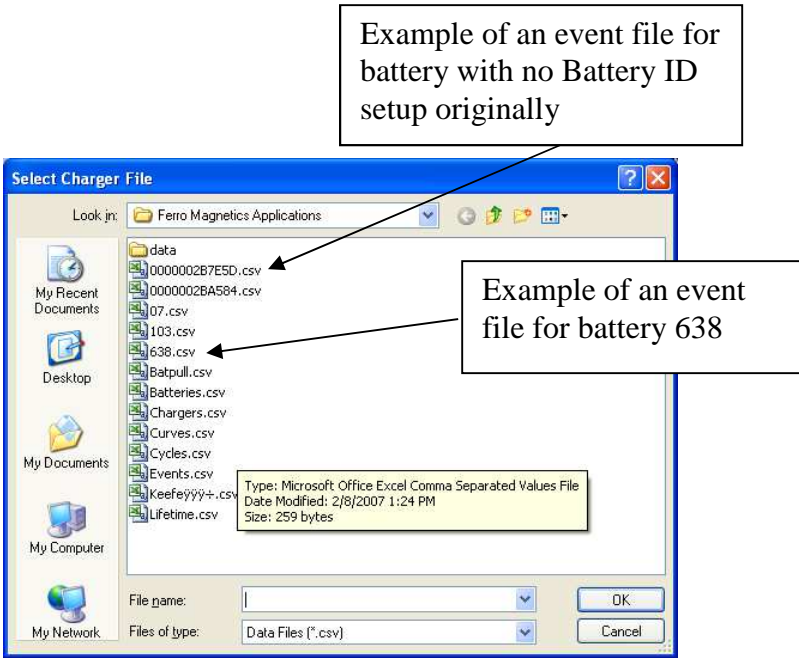
- a. Launch TOBi Reports Software by double-clicking the icon on your Windows® Desktop
- b. Click the SELECT FILE button located in the top left corner of the window.



- c. Select the battery file associated with the events you want to report on. The default location of the file is the My Documents\Ferro Magnetics folder.

The file name will be the Battery ID that was stored in the TOBi PI Wi-Z or POWER LOGGER WI-Z. If no Battery ID was entered during setup, the Factory ID will be substituted for the Battery ID.

## Section 4: TOBi Reports Software

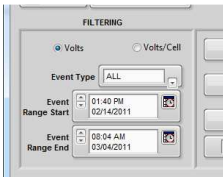


- d. Select the proper CSV file by double-clicking the file name or select with one click and then select OK.
- e. Once selected TOBi™ Reports will read in the battery event files and automatically scale the date range to match the dates over which the data was collected.

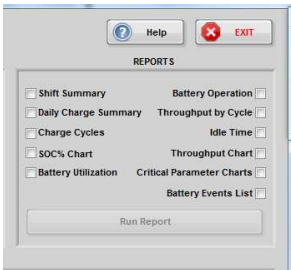


## Section 4: TOBi Reports Software

The date range can be adjusted for whatever period of time you wish to report on by using the up and down buttons located to the left of the Event Range Start and Event Range End windows or clicking on the calendar and selecting the date and time. The battery voltage can be displayed in total voltage or volts/cell by selecting the corresponding box.

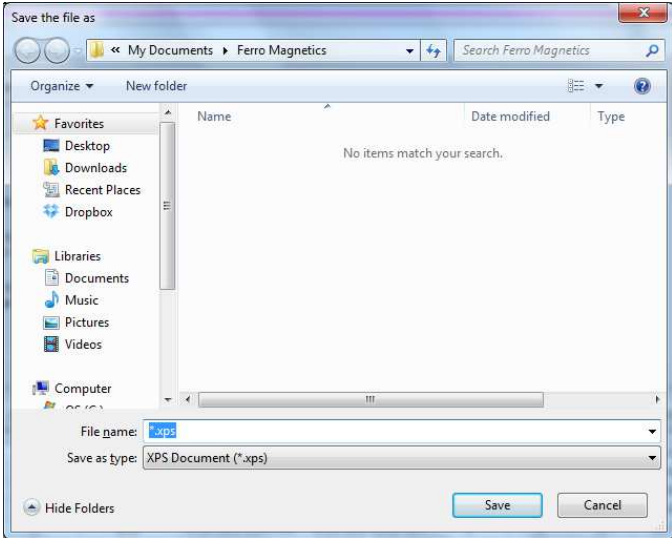


- f. Select the reports you wish to include and click the **RUN REPORT** button in the reports section located in the top right portion of the window



- g. When prompted, enter a name for the report and select a folder to place it in. By default, the report will be placed in the same folder as the CSV file opened in step d above.

## Section 4: TOBi Reports Software



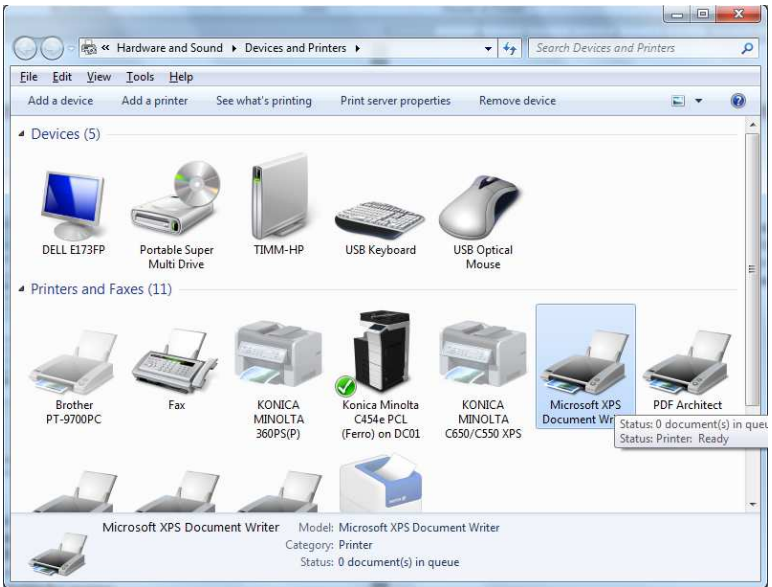
You may be prompted for additional options depending on which reports were selected. TOBi Reports will automatically create and format the entire report and indicate when the report is available for review.



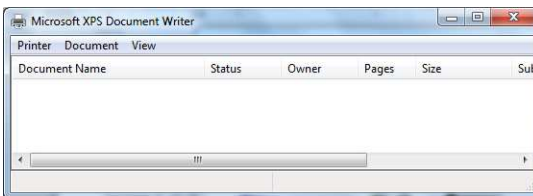
h. Select OK

## Section 4: TOBi Reports Software

- i. Reports are saved in Microsoft XPS file format. Reports can be viewed using the XPS viewer included in Microsoft Windows®. To automatically open reports in the XPS viewer, click on the Windows® start button and select 'Devices and Printers'. Double click on 'Microsoft XPS Document Writer'.

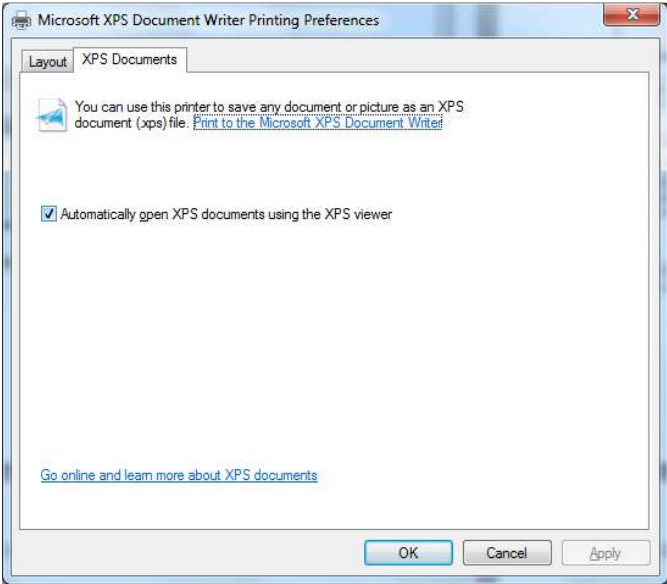


From the following dialog, select Printer then Printing Preferences.



## Section 4: TOBi Reports Software

Click on the XPS Documents tab and check the box next to 'Automatically open XPS documents using the XPS viewer'. Click OK.



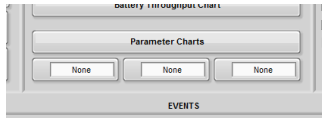
## Section 4: TOBi Reports Software

### 4.3 Printing a Chart

Any chart or graph not included in the report may be viewed and printed separately.

#### 4.3.1 To view or print a parameter chart

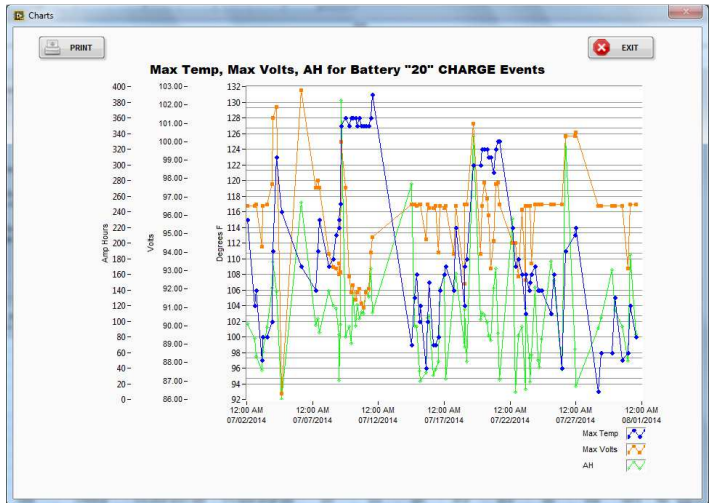
- a. Select up to three charts at a time by clicking inside one or more of the boxes underneath the Parameter Charts Button and select the event type in the filtering window.



Note: All parameters selected will draw on the same chart using dual axes. If you want single axis charts, select one parameter at a time to generate charts.

- b. Click the PARAMETER CHARTS button
- c. Once the Chart has been generated, you can print the chart by clicking the button in the top left corner of the chart window.

## Section 4: TOBi Reports Software



d. Click the EXIT button when you are done.

## Appendix

### Appendix A: FCC Information

This device complies with part 15 of the FCC rules. Operation is subject to the following two conditions. (1) This device may not cause harmful interference. (2) This device must accept any interference received, including interference that may cause undesired operation.

**WARNING:** To satisfy FCC RF exposure requirements for mobile transmitting devices, a separation distance of 20cm or more should be maintained between the antenna of this device and persons during operation. To ensure compliance, operations at closer distances than this are not recommended.

Contains FCC ID: S4GEM35XA

### Appendix B: Contact Information

Technical Support is available from Ferro Magnetics Monday – Friday 8:00 am to 5:00 pm CST.

Our engineering and technical support staff may be contacted via email at [engineering@ferromc.com](mailto:engineering@ferromc.com) or by phone at (314)739-1414 or fax at (314)739-1277.

## Appendix

### Appendix C: Warranty

#### **FERRO MAGNETICS CORPORATION TOBi PI and POWER LOGGER Wi-z WARRANTY - 1 Year**

This Warranty Agreement entered into between Ferro Magnetics Corporation, "Ferro", and the Original End User in respect to Ferro Magnetics battery charger control / retrofit kits for industrial electric truck charger usage.

- 1.0 **GENERAL** Ferro Magnetics Corporation (hereinafter called "Ferro") warrants that each **TOBi PI Wi-z** or **POWER LOGGER Wi-Z** supplied is of good workmanship and is free from any inherent mechanical defects, provided:
  - 1.1 The product is installed and operated in accordance with generally accepted industrial standards and in accordance with the printed instructions supplied with the product.
  - 1.2 The product is used under conditions for which it was designed and is not subject to misuse, negligence or accident.
  - 1.3 The product receives proper care, protection, and maintenance under supervision of competent personnel.
  - 1.4 The product is used within the published performance rating for the application involved.
  - 1.5 The product is used exclusively by the original user and by no other persons.
- 2.0 **PERSONS COVERED:** **TOBi PI Wi-z** and **POWER LOGGER Wi-Z** are warranted for 1 year from the date of shipment by Ferro to the original user.
- 2.1 Primary switch contacts, and fuses, are not warranted unless found to be defective prior to use.
- 3.0 **LIMITATION OF REMEDY** Any claimed defect is subject to Ferro's inspection and judgment, after the defective product has been returned by the original user at its expense to Ferro Magnetics Corporation, St. Louis, MO.
- 3.1 Ferro's liability is limited to the repair of the defect or, at Ferro's option, the replacement of the defective parts. Ferro will bear costs of parts replacement only; no labor or other services will be provided by Ferro. Ferro shall not be obligated to reimburse the original user or any other person for any work performed.
- 3.2 Replacement and exchange parts will be warranted for the remainder of the original warranty period, or for a period of thirty (30) days, whichever is greater.
- 3.3 Ferro shall not be liable for direct or indirect, special or consequential damages in excess of such repair or replacement. In no event shall the original user be entitled to recover for contingent expenses resulting from, but not limited to, telephone calls, telegrams, travel expenses, lodging, duties and taxes, labor, rental of replacement equipment, loss of business or profits or other commercial losses.
- 4.0 **USE OF DEFECTIVE PRODUCT** Continued use of a defective control after discovery of a defect may void all warranties.
- 5.0 **REPAIRED EQUIPMENT** Except as authorized in writing, this warranty does not cover any controls that has been repaired by any party other than Ferro Magnetics.
- 6.0 **MODIFIED EQUIPMENT** This warranty is void if this equipment has been modified without written permission from Ferro Magnetics.

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