EAGLE EYE
POWER SOLUTIONS

IBEX-Series
Pro & Ultra User Manual

Contents

1. Product Overview

1.1 Introduction

The IBEX is a digital battery tester that diagnoses the status of cell's or stationary battery's deterioration by means of measuring and analyzing internal resistance (R), voltage (V), and temperature (°C/°F).

1.2 Product Characteristics

Automatic Stationary Battery Measuring Algorithm

With an integrated automatic measuring algorithm, the IBEX automatically measures and stores data by contacting pin probes to the stationary battery poles.

Measuring Performance

The IBEX can measure up to 6000AH and 1.2V, 2V, 6V, 12V cells. It also has a ripple removing algorithm that insures precision of ±2.0 percent during floating charge.

Rapid Measuring Time

The IBEX performs voltage and ohmic resistance tests in less than 3 seconds. Results are saved automatically so the tester can quickly move from cell to cell.

1.3 Before Reading This Manual

Operation methods and safety measures described in this manual will be applicable only for the use of this tester for original purposes. If you use the tester in a way not specified or prohibited in this manual, we cannot ensure your safety or that of your properties. Please read this manual carefully, and use it correctly.

2. Equipment Checklist

2.1 Ultra Kit

Ultra-Kits come standard with:

- IBEX-Ultra Body
- 2x Li-Ion Batteries
- Soft Poly-Vinyl Bag (IBEX neck holder)
- Shunt (50mV/50A, 1mΩ, 1.0 Class)
- 4-Point Test Leads with Spare 4-Pin Test Lead Tips
- Temperature Probe
- USB to USB Cable to upload to a PC
- DC Clamp Meter for Ripple Measurement
- Serial Comm Excel & Exmons Ultra Diagnosis Software programs
- Standard Charger (100 to 240 VAC)

- Robust, Combination Lock Carrying Case
- IBEX-Ultra User Manual & Quick Start Guide

3. Safety Warnings

Never contact AC or DC-over-60V to the tester terminal! It can result in serious injury to the user and damage the tester.

3.1 User and Equipment Protection

When you connect the IBEX measuring probe to the post of a stationary battery, be extremely careful. If you cause a short circuit in the two poles positive (+) and negative (-), the stationary battery post will short and can result in serious injury to the user and equipment.

Be careful when using the battery (cell).

- **Subjecting the battery to damage, heavy impact, heat, soaking, high temperature, drilling, etc. may result in explosion.**
- **Batteries and chargers that are not approved by the manufacturer may lead to explosion.**

Do not leave this device in a car under extreme sunlight or other sources of heat.

If you carry this device, keep it in its designated case. It can reduce the impact if dropped.

In the event that you drop the device in water or that metal debris get in the device, discard the battery pack immediately to prevent a fire or electric shock.

3.2 Preventing Serious Personal Injury

To prevent fire, overheating, chemical leakage, and explosion, adhere to the following safety measures:

- Do not test batteries or battery strings higher than 60V.
  NOTE: The IBEX was designed to test at the cell level.
- Only use the provided battery pack that comes with the IBEX.
- Do not short-circuit, disassemble, or modify the provided battery pack in any way.

- Do not change positive and negative terminals on the battery pack.
- Do not charge the battery pack outside the 0 – 40°C (32 – 104°F) temperature range.
- Do not exceed the specified charge time.
- If you find severe heat, smog, or odor during the battery pack charging process, immediately remove the battery charger from the outlet, and stop charging the battery in order to prevent a fire.
- Do not cover the battery charger with a cloth. It can deform the case or cause a fire, due to overheating.
- Do not wash the device with volatile solvents such as paint thinners, benzene, or others. It may cause a fire or personal injury.

3.3 Handling Precautions

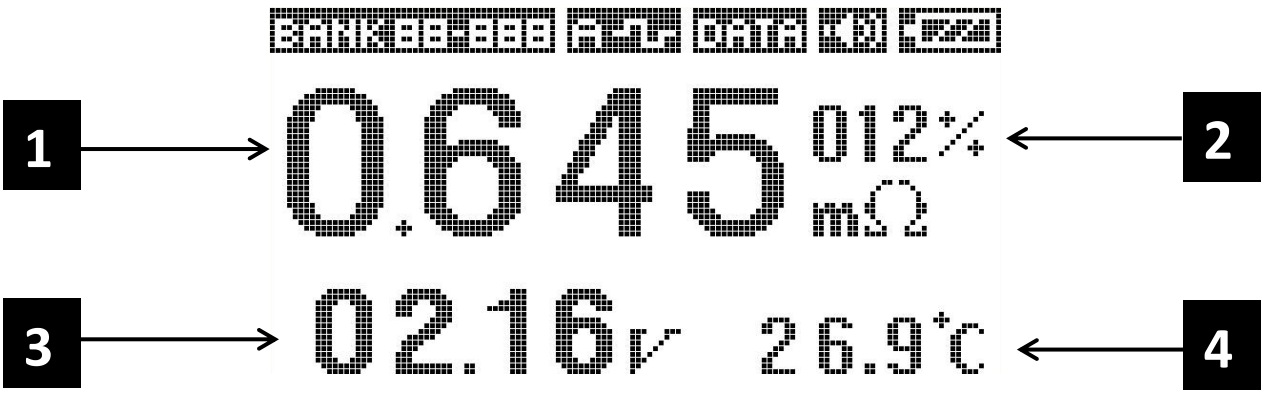
- Do not drop or subject to physical shock.
- The IBEX is not moisture-resistant, do not use in environments with excessively high humidity.
- Do not leave the IBEX in direct sunlight; extended exposure will damage the device.
- Do not attempt to disassemble the IBEX or service the internal circuitry. **NOTE: Disassembling the unit will break the warranty sticker and void the warranty.**

4. On-screen Display (OSD) and Button Functions

4.1 On-screen Display

The measuring screen is displayed after turning on the IBEX and while performing measurements.

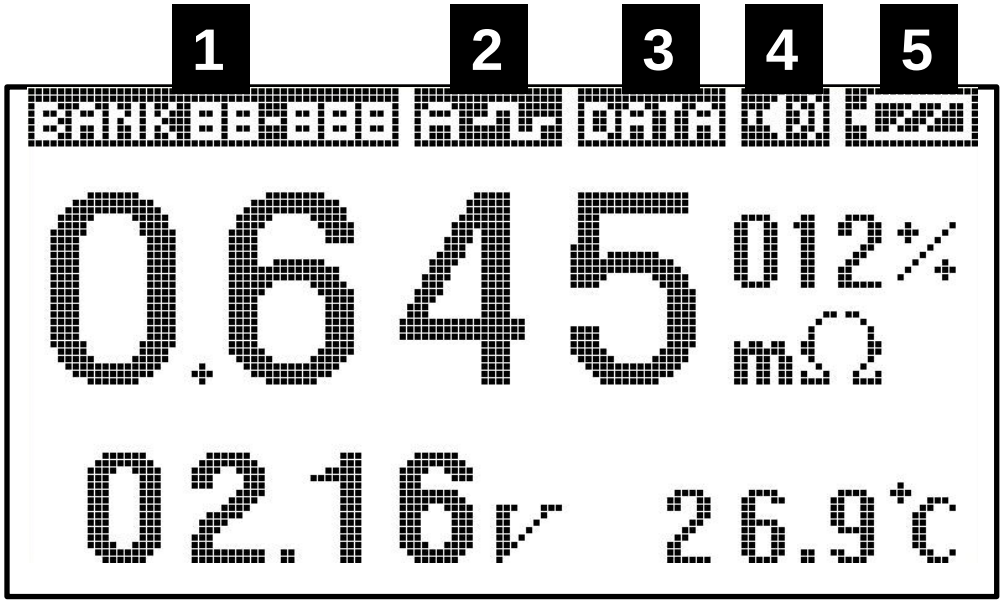
1. Stationary battery internal resistance
2. Internal resistance percent (%) compared to alarm standard value
3. Stationary battery voltage
4. Stationary battery temperature (if using temperature probe)



4.2 Status Icons

Status icons indicate current status of the IBEX. These icons always appear in the upper part of the on screen display. The below figure demonstrates how the icons vary according to the changes in status.

1. Bank Indicator: Displays the number of the bank (00) and the number of the cell (000) that is currently selected. The bank will always be displayed as “BANK XX-XXX” regardless of what the bank name is changed to.
2. Measuring Mode: Displays if the unit is set to automatic “A” or manual “M” measuring mode.
3. Displays when the last cell of the bank is stored to internal memory.
4. Displays when the buzzer is on.
5. Displays the internal battery level.



4.3 Key Functions

No.	Key Name	Applicable Mode	Functions
1	**POWER**	Always	turn IBEX power ON or OFF.
2	**MENU**	Measuring Mode	Switch from the measuring mode to the setup mode.
		Setup Mode	Switch from the setup mode to the measuring mode.
		Character Input Mode	Switch input-able character tables to English, numbers, or special characters.
3	**ESC**	Setup Mode	Move to the upper menu.
			In the character input mode, do not store character strings, and move to other modes.
4	**SAVE**	Character Input Mode	Store the selected characters.
5	**CAL/del**	Measuring Mode	Calibrate the resistance value of the measuring probe.
		Character Input Mode	Remove the inputted characters with the backspace function.
6	**TRY/prt**	Measuring Mode	If it is not measured as open status of inner storage battery, you can forcibly measure.
		Setup Mode	Thermal print the relevant data (bank or cell unit).
7	**ENT**	Setup Mode	Select each menu and detailed functions.
		Character Input Mode	Input the selected characters by the ◀ and ▶ keys.
8.	**▲ , ▼**	Setup Mode	To select the desired function, move the cursor up and down.
		Measuring Mode	By increasing or decreasing the bank number of the top icon, choose the measurement position.
		Character Input Mode	Move the cursor on the characters to be input or corrected left or right side.
9	**◀ , ▶**	Setup Mode	Move the cursor to the left or right to select the desired icon.
		Measuring Mode	Increase or decrease the cell numbers of the top icon to select the measurement position.

Hardware Reset Key

In the event that the on-screen display freezes or becomes unstable press the reset key located on the back of the unit. To do this gently press a small object such a paper clip through the hole until the button clicks. The unit will reset, no data will be lost.

5. Battery Pack Maintenance

5.1 Charging the Battery

The Li-Ion battery that comes with the IBEX can be charged using the following methods:

1. Connect the charger's power cord to a single phase 100~230V 50/60hz power plug. <POWER> Lamp will be lit and turn to green.
2. Insert the power adapter recharge connector to the power outlet terminal on the right side of the IBEX. <POWER> Lamp will be lit and turn to red.
3. Charge the battery pack. After approximately 120 minutes, the battery pack will be fully charged. When the charge is complete, <POWER> Lamp will switch from red to green.

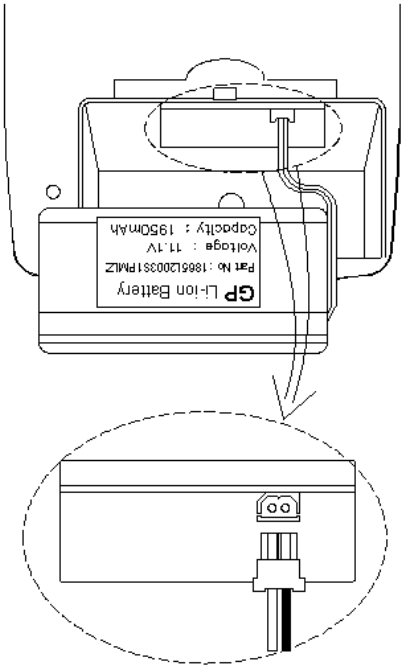
5.2 Installing and Removing the Internal Battery

The IBEX is shipped with a fully charged primary and also a spare battery. Continuous use and recharge/discharge of the battery will slowly shorten its life. When the total life of the battery falls below one hour (typically after 300-500 charge cycles), replace the battery with same model. Contact Eagle Eye for a replacement battery.

Refer to the diagram to replace the battery.

After arranging the IBEX battery pack in the same direction as shown. The battery packs have a unique connector that should only be able to be inserted into the IBEX one way.
After inserting the connector, insert the Li-ion battery pack into the IBEX housing. When the battery pack is completely inserted, close the cover.

CAUTION: If the connector is forced into the unit in reverse, it can damage the battery and the IBEX due to internal short-circuit. Always ensure the connector is being inserted correctly.

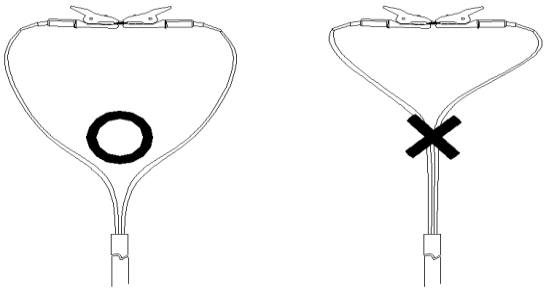


6. Zero-Point Calibration

If you believe that that the unit is not testing accurate the IBEX can be internally zero calibrated in the field. This does not replace the importance of getting the IBEX properly calibrated on recommended calibration intervals. If successfully zeroed and results still appear to be inaccurate your testing leads may be faulty and should be replaced. Contact your local Eagle Eye representative for replacement.

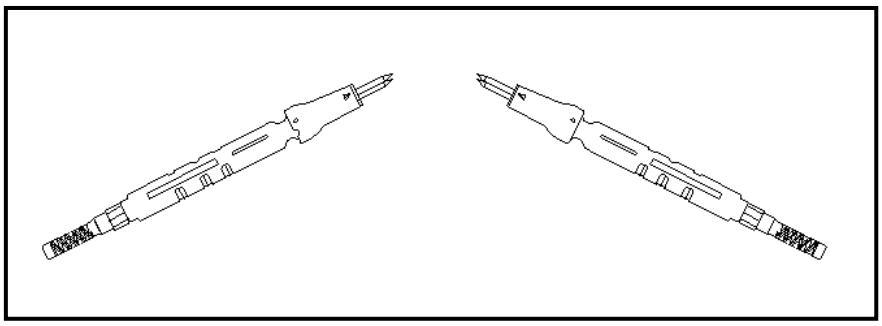
6.1 Calibration Procedure

The calibration procedure can vary depending on the type of test leads being used.
During the calibration be sure not to aggressively bend the cables OR move the probes during the calibration process.



Connect the test leads as shown in the following diagrams. With the leads crossed, press the <**CAL/del>** button. The message “Sure to CALIBRATE?” will appear. Press the <**ENT>** button to initiate the calibration, the process will take approximately 30 seconds.

1



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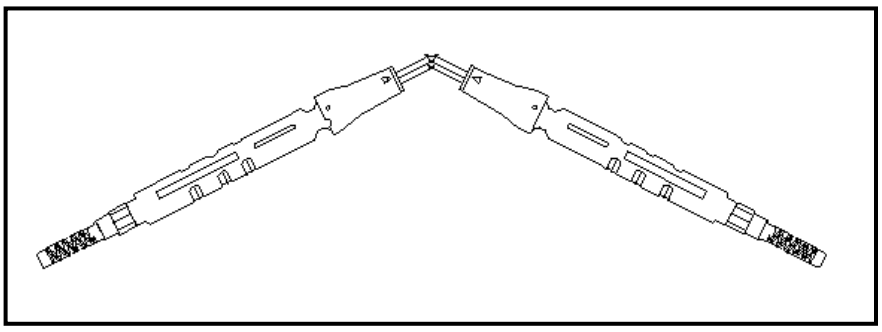
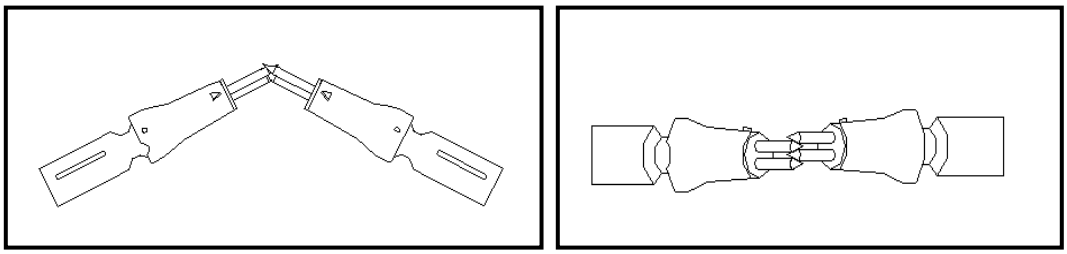


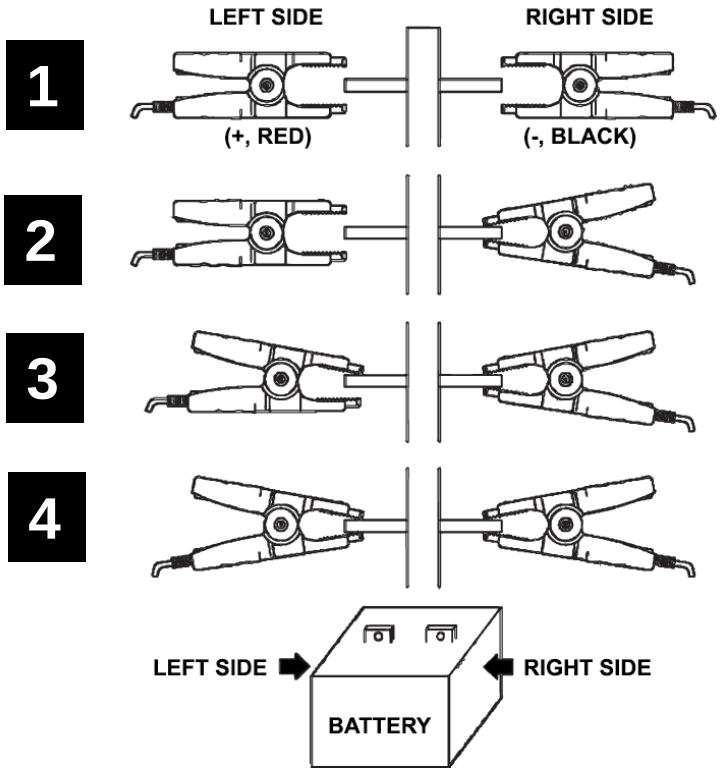


7. Stationary Battery Testing

To test battery voltage and resistance using the IBEX, the test leads need to be connected to the positive (+) and negative (-) poles of the battery. The measuring method varies slightly based on the type of test lead being used.

Pin Type
Press the test leads onto a flat surface on the battery's poles. Start with the negative then the positive. Be sure to keep steady contact during the measurement.

Clamp Type
Connect the clamps to their respective polarity, start with the negative then connect the positive clamp.



7.1 Measuring Modes

The IBEX has two main measurement modes, automatic and manual.

7.1.1 Automatic Measurement

To set the unit to automatic mode press the <**Menu>** button, go into the Storage Select menu and select the auto icon.

With automatic measuring mode the IBEX will save the measuring results as soon as the test leads are removed from the battery. With this mode the user can quickly move from one battery to the next efficiently.

7.1.2 Manual Measurement

To set the unit to manual measurement mode press the <**Menu>** button, go into the Storage Select menu and select the manual icon.

With manual measurement the IBEX will not automatically save the test results after measuring. In order to save results the user must press the <**SAVE>** button before removing the test leads. Given the nature of this testing method it may be difficult to use manual measurement mode with the pin type probes.

7.2 Reverse Polarity

If the user accidently measures the cell in reverse polarity, a warning message will appear. In this incidence remove the test leads and press any key to return to the main screen. This should not harm the IBEX.

8. Menu Operation

The IBEX has a variety of menu options. The following steps cover basic menu operation.

1. Press the <POWER> button to power the IBEX on and off.
2. When the IBEX enters standby mode, press the **<MENU>** button to move to setup mode.
3. How to move the cursor in the menu screen
   - Use the direction buttons <◀ , ▶> to move the cursor.
4. How to move to the sub-menu
   - To get into the sub-menu, move the cursor to the menu icon to be used, and then press the **< ENT >** button.
5. Move the upper menu screen
   - Press the **<ESC>** button to exit to the upper menu.
6. How to modify parameter values
   - Enter the Alarm Setting menu. Use the <▲ , ▼> buttons to move the cursor on the

parameter values to be modified, and then use the <◄ , ►> buttons to modify the values .

8.1 Modifying Bank and Alarm Information

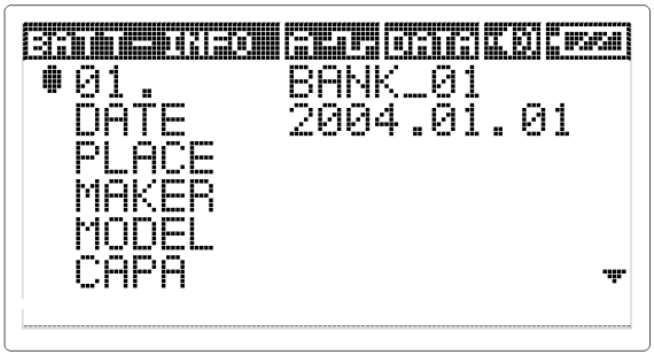
To input or modify characters such as battery data, bank name, alarm setting name, etc., carefully read the methods below. It will help you input characters quickly.

NOTE: If you have any version of the Exmons software the alarm and bank information can be edited more efficiently using the software.

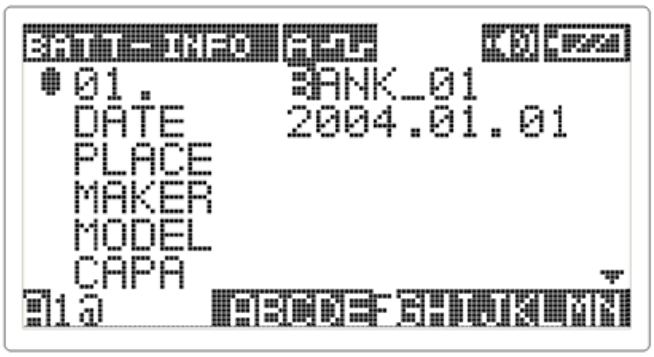
8.1.1 Modifying Bank Info

To edit bank information:

1. Enter setup mode and press the direction button to move the cursor to the Battery Info menu, and then press the **<ENT>** button.
2. Move the cursor to the Bank Information menu and press the **<ENT>** button.
3. BANK LIST appears on the screen.
4. Use the <▲ , ▼> buttons to select the bank to be modified, and press **<ENT>**.
5. As shown below, move the bank name to be modified with the cursor, and then press the **<ENT>** button to enter the character input mode.



6. As shown below, the character input bar will appear in the character input mode. Press the **<MENU>** button to change the type of characters in order of English, number, and special characters.



7. **To input special character (e.g., '_'),** press the **<MENU>** button to switch to the special character input mode, and then enter the character using < ◄ , ► > and **<ENT>** buttons.

8.2 Submenu Icons

The menu of the IBEX is composed of 7(Pro)/8(Ultra) icons with the following sub-menus.

Main Menu	Submenu	Menu Functions
Utility Setup 		**Hardware SETTING mode**
	Backlight Setup	LCD backlight time setup
	Contrast Level Setup	LCD brightness level setup
	Temp Unit Select	Temperature scale setup
	Date & Time Set	Date and time setup
	Auto Power Save	Automatic power-saving time setup
	Buzzer On/Off	Buzzer ON/OFF setup
	Parameter INIT	Parameter value initialization
	Current & Ripple	Ripple current measuring (See 8.2.1)
Measuring Unit Select		**Select the desired measuring units**
	Ohms	For measuring resistance values
	Siemens	For measuring conductance values
Storage Select 		**Measured value save (auto/manual) selection mode**
	Manual	Manual stationary battery saving setup
	Auto	Automatic stationary battery saving setup
Normal / Fine 		**Select the measuring speed**
	Auto Measuring	Auto-selecting the measuring speed by battery capacity
	Fine Measuring	Fine measuring (measuring speed eight seconds)
	Normal Measuring	Normal measuring (measuring speed three seconds)
Alarm Set 		**Alarm value input according to stationary battery**
	Open File	Select/modify alarm values
	Alarm Now View	Display the current alarm values
Batt. Information 		**Stationary battery data input/modify mode**
	Bank Information	Input/modify the stationary battery data in the IBEX
	Receive Bank Info	Stationary battery data transfer from the PC
	Bank Resizing	Redefinition of the IBEX's banks and cells

Report 		**Measured value storage/management**
	Data View	Display internally stored stationary battery measurement value
	Data Transfer	Transfer stationary battery measurement value to a PC

8.2.1 Utility Setup

Used for selecting hardware setup or temperature mode.

Backlight Setup
Used to set the backlight timer. The backlight can be set to automatically turn off between 1 and 10 minutes.

Contrast Setup
Used for adjusting the brightness of characters and icons displayed on the screen.

Temp. Select
Used to change the temperature scale from Fahrenheit or Celsius.

Date & Time Set
Used for setting up current date and time.

Auto Power Save
Used for saving the battery consumption by turning off the power when the device is not used for a set period of time. The device can be set to automatically turn off between 1 and 10 minutes.

Buzzer On/Off
Used for turning off buzzers such as button-pressing sound, alarm, etc.

Parameter Reset (Hard Reset)
Used for restoring the IBEX to default factory settings. **The hard reset will erase all stored data.**

Current and Ripple (Ultra Model Only)
Available on the IBEX-Ultra model, this feature is used for measuring DC current and ripple current or percent. To use this menu, connect the CLAMP METER (PRON-4400) leads to the IBEX-Ultra, and polarity and color should be corrected.

1. Press the **<ENT>** button to CURRENT & RIPPLE ICON in the UTILITY menu (Figure 1).
2. After selecting the CURRENT & RIPPLE ICON, then you can see the value of DC current and ripple current (Figure 2).
3. Put the rotary switch to 'DCA' on PRON-4400, and press <**CAL/del**> button for zero-point calibration on IBEX-Ultra.

4. Hang the clamp arm of PRON-4400 with desired measurement position/power line.
   NOTE: If the 'CHECK POLARITY!!' message appears, polarity is reverse-connected and needs to be corrected.
5. During measurement, press the <◀> button, and then you can check 20ms WAVEFORM (Figure 3). If you want to move back to Figure 2, press the <ESC> button.
6. During measurement, press the <▶> button, then you can check the graph of frequency analysis (FFT). The graph indicates harmonic contents of 60Hz/50Hz commercial frequency (Figure 4). If you want to move back to Figure 2, press the <ESC> button.
7. After measurement is complete, press **<ESC>** button, then you can move to the UTILITY menu (Figure 1).

Fig. 1

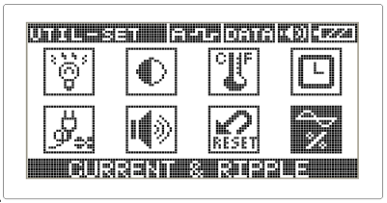


Fig. 2

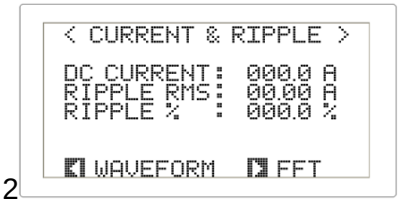


Fig. 3

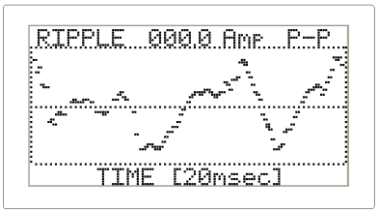
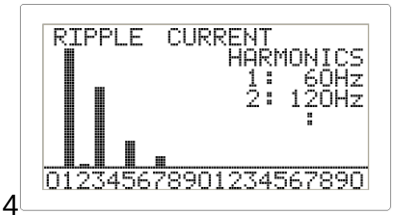


Fig. 4



8.2.2 Measuring Unit Select

Used to select between ohmic measurement units of ohms (resistance) or siemens (conductance). Only one measurement unit may be set at a time and it applies to the entire dataset of the IBEX.

***Note that switching between siemens and ohms involves a complete data reset of the unit. Existing data should be transferred from the IBEX prior to changing measurement units.**

8.2.3 Storage Select

Used for selecting storage method as automatic or manual. See page XX for details about storage methods.

8.2.4 Select Normal/Fine

Used for selecting whether to measure battery resistance by Fine or Normal mode.

Fine Mode: Increased precision at a measuring time of 8 seconds.
Normal Mode: Decreased precision at a measuring time of 3 seconds.
Auto Mode: Automatically selects measuring mode based on battery capacity.

8.2.5 Alarm Setting

Used to setup alarms in the IBEX. Alarms are standard values used to measure against when testing stationary batteries. Each alarm can be thought of as a battery model. Alarm settings should reflect the standard resistance, voltage, and temperature values of the battery being tested.

Open File

Used to enter, modify, or select the stationary battery's alarm setting. After setting the stationary battery's alarm settings press the **<SAVE>** button.

NOTE: To set the alarm for a certain bank, first make sure the bank is selected on the main screen, and then open the correct alarm setting.

Alarm Now View

Displays the currently selected alarm values; use this to verify that the alarm is correctly set for selected bank. There is only one alarm active on the IBEX at any one time.

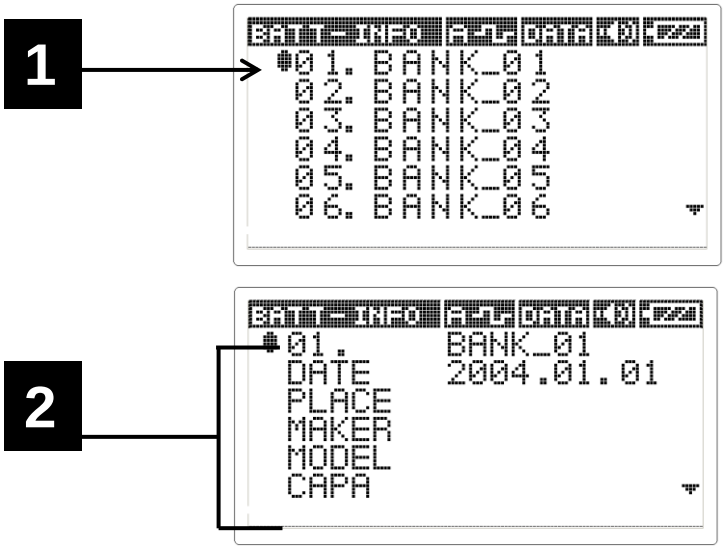
8.2.6 Battery Information

Used to manage bank information, receive bank data from the software, and change the bank size.

Bank Information

Used for entering and correcting bank data. Bank information can be edited in this menu.

1. Select the bank you wish to edit and press the **<ENT>** button to edit the selected bank.
2. The bank's name, date, place, maker, model, and capacity can be entered here. Highlight the desired value and press **<ENT>** to edit.
3. Press the **<SAVE>** button to save the changes made.



Receive Bank Info

Bank and alarm information can be edited quickly in the Exmons software and then saved to the IBEX. For details on this process see page XX in the Exmons manual.

Bank Change

Used to change the number and size of banks in the IBEX; each model can hold a different quantity of banks and cells. Refer to the tables below for sizing information.

IBEX-Pro

BANK	CELL	BANK	CELL	BANK	CELL
1	600	**12**	36	**22**	12
3	196	**14**	30	**24**	10
4	144	**16**	24	**28**	8
6	90	**18**	20	**30**	6
8	64	**20**	16		
10	48				

IBEX-Ultra

BANK	CELL	BANK	CELL	BANK	CELL
1	4,800	**12**	288	**22**	96
3	1,568	**14**	240	**24**	80
4	1,152	**16**	192	**28**	64
6	720	**18**	160	**30**	48
8	512	**20**	128		
10	384				

NOTE: Resizing the banks in the IBEX will erase all data currently stored in the unit.

1. After selecting Bank Change use the arrow keys to select the size of the bank.
2. The number of banks is displayed on left and the cells are displayed on the right.
3. As you change the number of the banks the number of cells changes accordingly.

4. When the desired ratio between banks and cells is reached press the **<ENT>** button to initiate the bank resizing. When completed the IBEX will restart.

8.2.7 Report

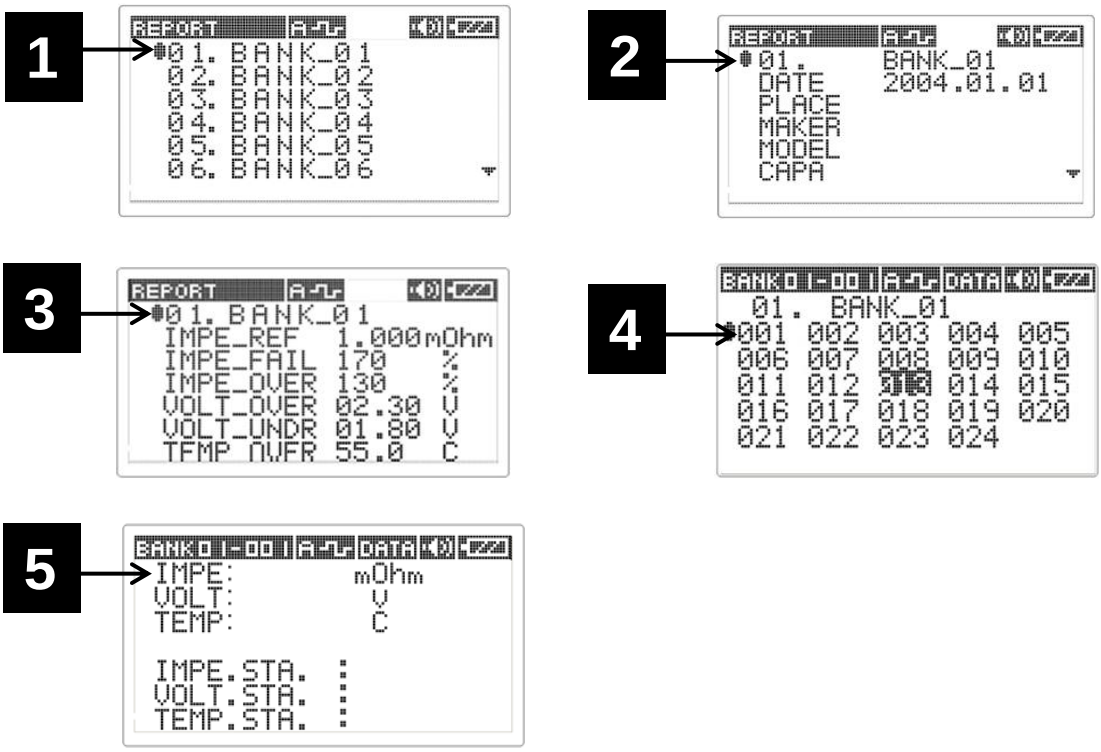
Used to display measured data, send data to software, and delete data.

Data View

NOTE: Printing test results is done under Data View, see section 8.3 for instructions.

Displays measured data for each bank though 5 different screens.

1. The first screen displays all of the banks currently listed in the IBEX. Select the desired bank and press **<ENT>**.
2. The bank view screen displays all of the bank data such as measured date, place, maker, model, and capacity.
3. The bank alarm screen displays the alarm setting for the selected bank.
4. The cell view screen displays all of the cells in the bank on a grid. Bad cells which have failed their alarm setting will be highlighted. Press **<ENT>** on a cell to view its measurement data.
   NOTE: Press the **<CAL/del>** button to erase measurement data for that cell.
5. The individual cell view screen displays the cell's measurement data such as resistance/impedance, voltage, temp, and the alarm standard.



Data Transfer
Used to transfer measuring data and information to the software.

See section XX for details on connecting the IBEX and trasferring data into the software.

Bank Erase All
Used for deleting all of the measrement data stored in the IBEX.

8.3 Printing Measurement Data

The IBEX can print measurement data to an optional thermal printer. Either an entire bank or an individual cell can be printed.

1. To print measurement data, line up the thermal printer with the Printer Port on the top of the IBEX.
2. Press the **<Menu>** button and go into **Report** then **Data View**.

8.3.1 Bank-Unit Print

1. After selecting **Data View** all of the banks will be displayed.
2. Scroll to the desired bank then line up the IBEX with the printer and press the **<TRY/prt>** button.
3. The entire bank will print. Empty cells will be omitted from the printout.

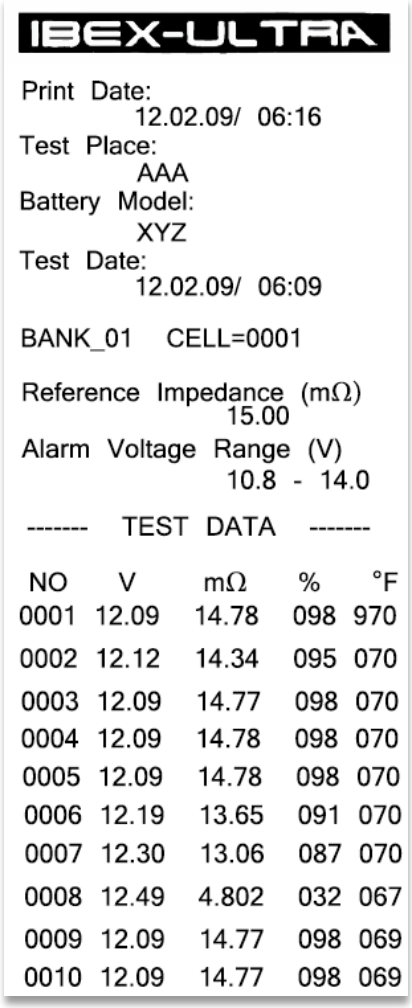
8.3.2 Cell-Unit Print

1. After selecting **Data View** all of the banks will be displayed.
2. Select the desired bank and press **<ENT>** three times to display the cell-view screen.
3. Press the **<TRY/prt>** button to print the cell's measurement data.

8.3.3 Sample Printouts

Pictured below are the two reports the IBEX can print.

Bank-Unit Printout


IBEX-ULTRA

Print Date:
12.02.09/ 06:16
Test Place:
AAA
Battery Model:
XYZ
Test Date:
12.02.09/ 06:09

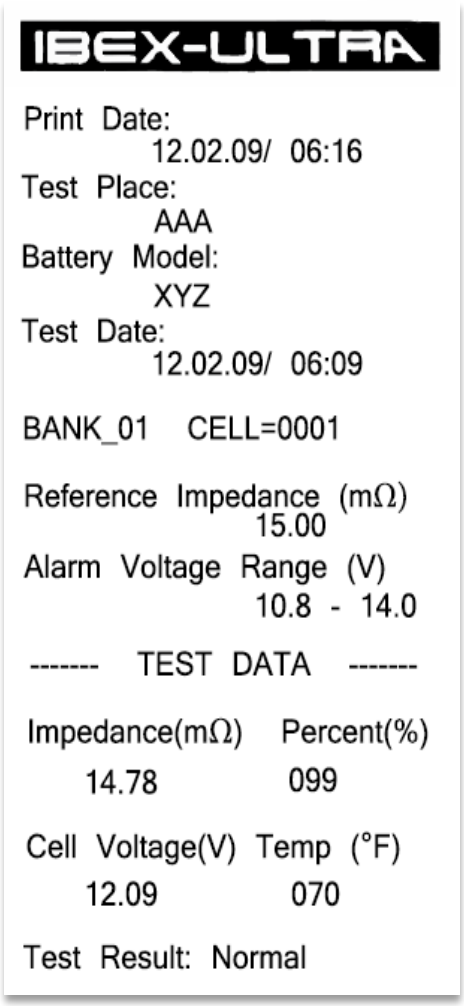
BANK_01 CELL=0001

Reference Impedance (mΩ)
15.00
Alarm Voltage Range (V)
10.8 - 14.0

------- TEST DATA -------

NO	V	mΩ	%	°F
0001	12.09	14.78	098	970
0002	12.12	14.34	095	070
0003	12.09	14.77	098	070
0004	12.09	14.78	098	070
0005	12.09	14.78	098	070
0006	12.19	13.65	091	070
0007	12.30	13.06	087	070
0008	12.49	4.802	032	067
0009	12.09	14.77	098	069
0010	12.09	14.77	098	069

Cell-Unit Printout


IBEX-ULTRA

Print Date:
12.02.09/ 06:16
Test Place:
AAA
Battery Model:
XYZ
Test Date:
12.02.09/ 06:09

BANK_01 CELL=0001

Reference Impedance (mΩ)
15.00
Alarm Voltage Range (V)
10.8 - 14.0

------- TEST DATA -------

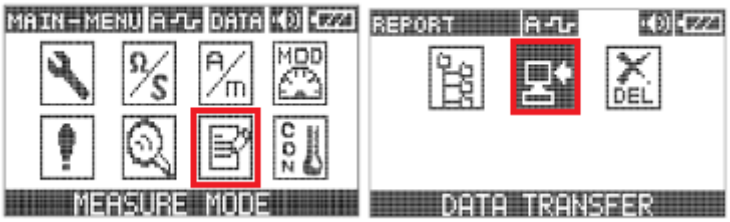
Impedance(mΩ) Percent(%)
14.78 099

Cell Voltage(V) Temp (°F)
12.09 070

Test Result: Normal

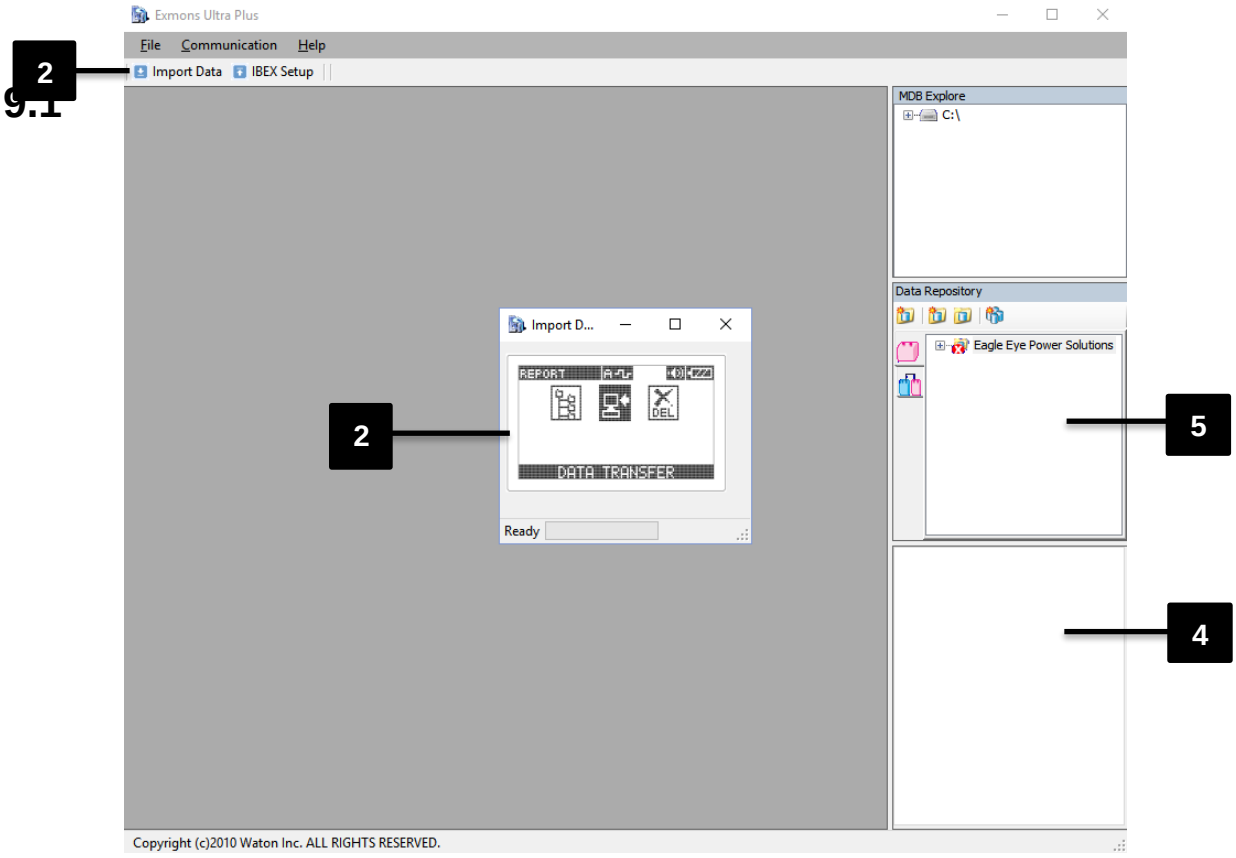
9.Transferring Data from IBEX to Exmons Software

1. Connect the IBEX to the PC using the USB cable and turn the unit on.
2. Press the “Import Data” button in the software and the transfer window will appear.
3. On the IBEX press [MENU] and scroll over to “Report” and press [ENT] then scroll over to “Data Transfer” and press [ENT] to initiate the data transfer.



4. When the transfer is complete the results will appear in the temporary data repository.
5. Permanent repository, see next section Saving Test Data

*NOTE: If transferring intercell resistance, Exmons will ask to treat data as intercell resistance, select yes. Battery internal resistance and intercell resistance must be transferred separately.



Saving Test Data

1. Open the Repository Commander by clicking the “Add to Repository” button located in the upper left corner of the temporary repository.

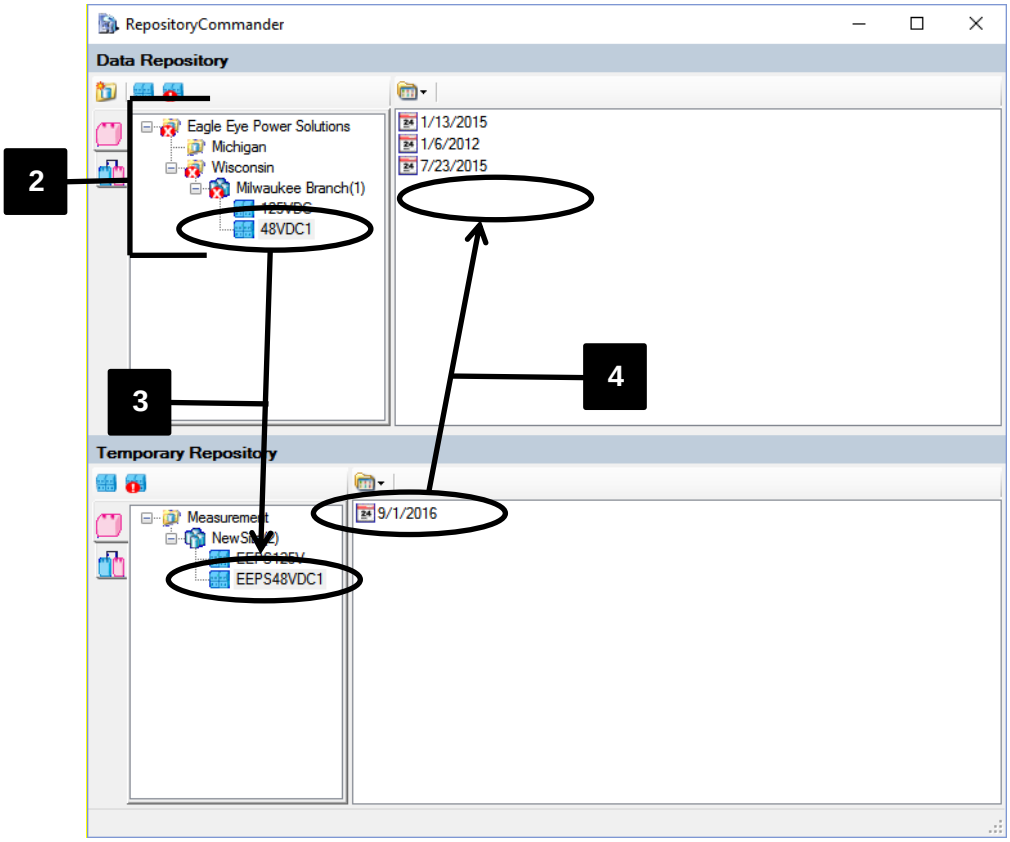
2. Before moving data, a folder structure needs to be put into place. In the white box of the Data Repository area **right click to:**

- **A.** Create a **Root Group** (i.e. Company Name)
- **B.** Create a **Group** in the Root Group (i.e. Region or Customer) You can have multiple groups

C. Create a **Site** in the Group (i.e. The substation containing the banks being tested)
D. Create a **String** in the Site (i.e. The battery string(s) being tested at this site)

3. To transfer the results, select the appropriate site then specific battery string you'd like to transfer data to from the data repository. Then move down to the temporary repository to select the bank you're intending to save in the selected permanent string.

4. With both sites open drag the test bank timestamp into the Permanent Repository. (NOTE: You must have similar locations selected, i.e. you cannot transfer a bank into a group) When finished close the Repository Commander.



9.2 Edit Bank Information and Alarms

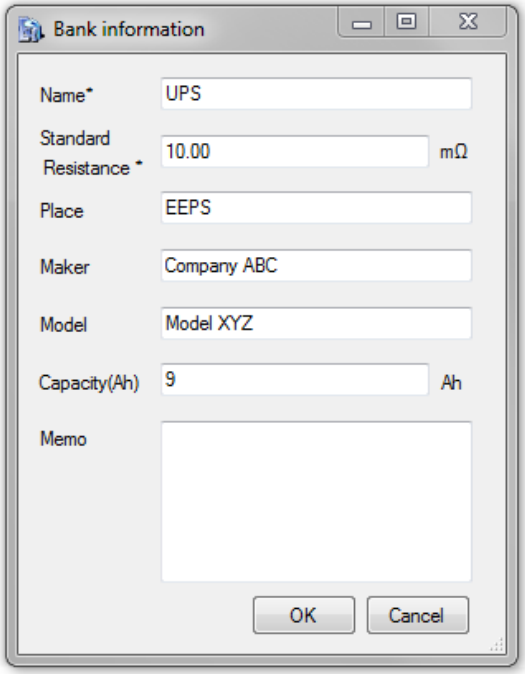
1. Right click the newly added bank in the Data Repository to edit its Alarm and Properties.

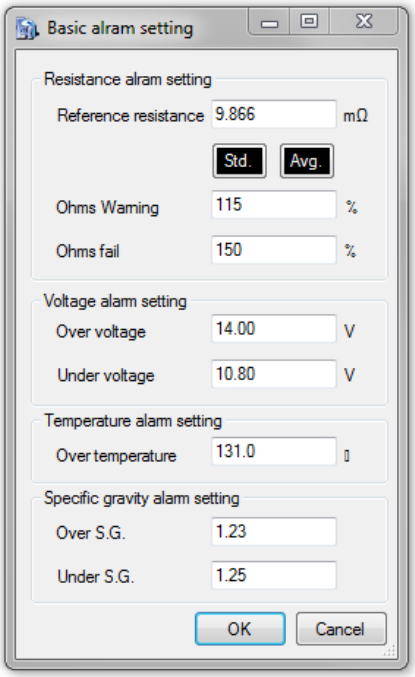
2. Properties: You can edit the bank information such as name, place, maker, etc. If known, the standard resistance for the tested batteries can be entered here. Select "OK" to save.

3. Alarm Property: For accurate reports alarm information must be entered. The entire alarm properties box must be filled out including the specific gravity. Select "OK" to save.

A. If standard resistance is being used press "Std." otherwise you can select "Avg." to use the average resistance of the bank.

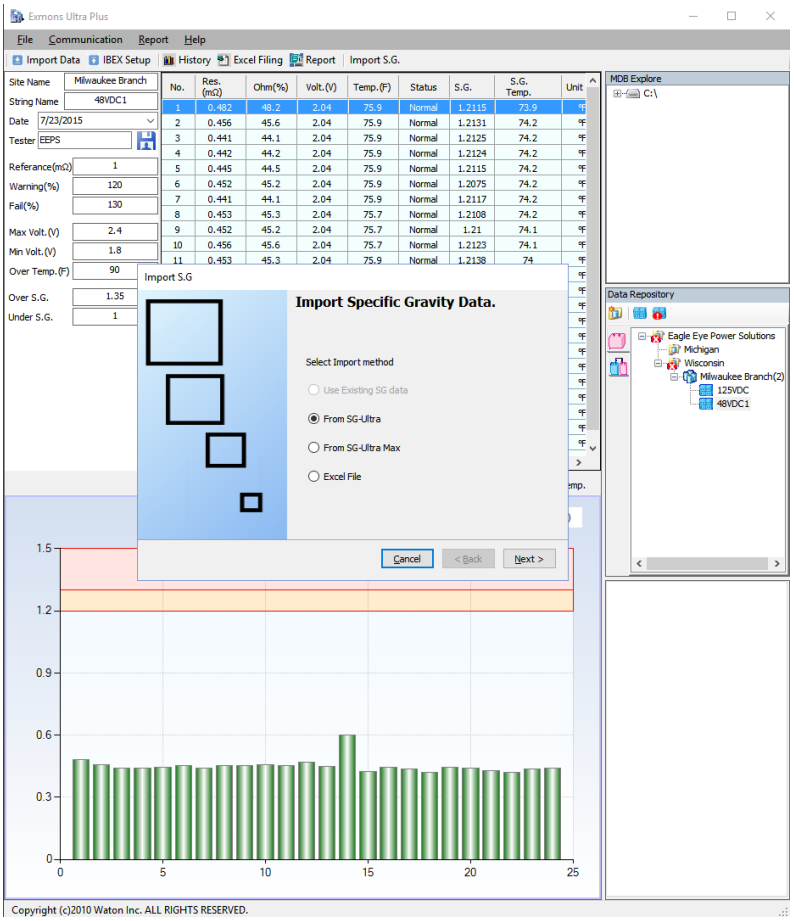
B. Set the warning and fail (%) of the batteries.
C. Set the voltage parameters.
D. Set the temperature warning in °F.
E. Set the specific gravity parameters as stated by the manufacturer specifications.





9.3 Downloading Specific Gravity

(Skip this section if not using Eagle Eye S.G. Ultra or Ultra Max)
1. Double click the bank you wish to transfer S.G. data into to open the bank. The screen will appear as shown below.
2. Click “Upload S.G.” and a window will appear asking you to select how you wish to upload the data. You can select an SG-Series unit or upload from Excel file.
3. Click “Next” to proceed.

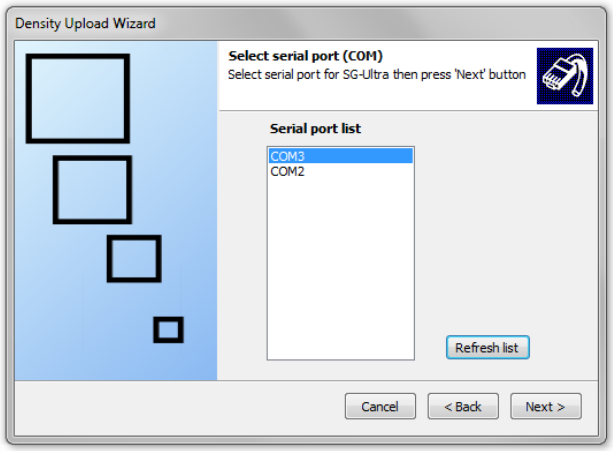


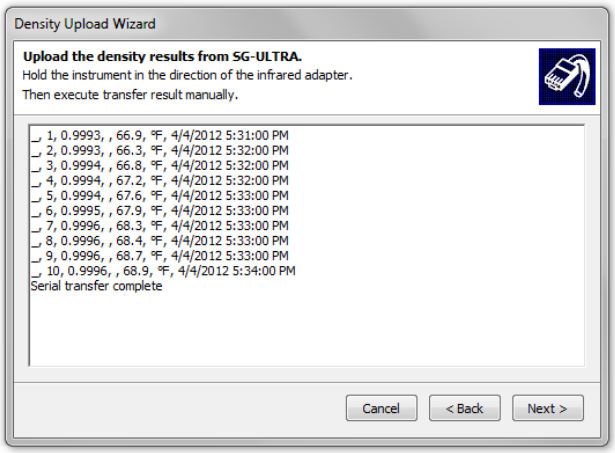
4. Plug in the IRDA-USB transfer cable then click “Refresh List” to reveal the COM port. You can also identify the correct COM port in the PC’s device manager.

5. Click “Next” and the data transfer window will appear. Before transferring results, the window will be blank and ready to receive data.

- **A. From SG-Ultra:** Press and hold the right arrow key on the unit until “**Memory out, Execute? (All)**” appears on the display. Line up the unit’s IRDA within 6 inches of the IRDA receiver and press the “**ok/meas.**” button to transfer the data.
- **B. From SG-Ultra Max:** Press “**Menu**” then select “**Measuring Data**” followed by “**Export**” then select either all the results or a selected range. Line up the unit within 6 inches of the IRDA receiver and press “**Ok**” transfer the results.

6. When successful the results will appear as shown below. Click “Next” to continue.

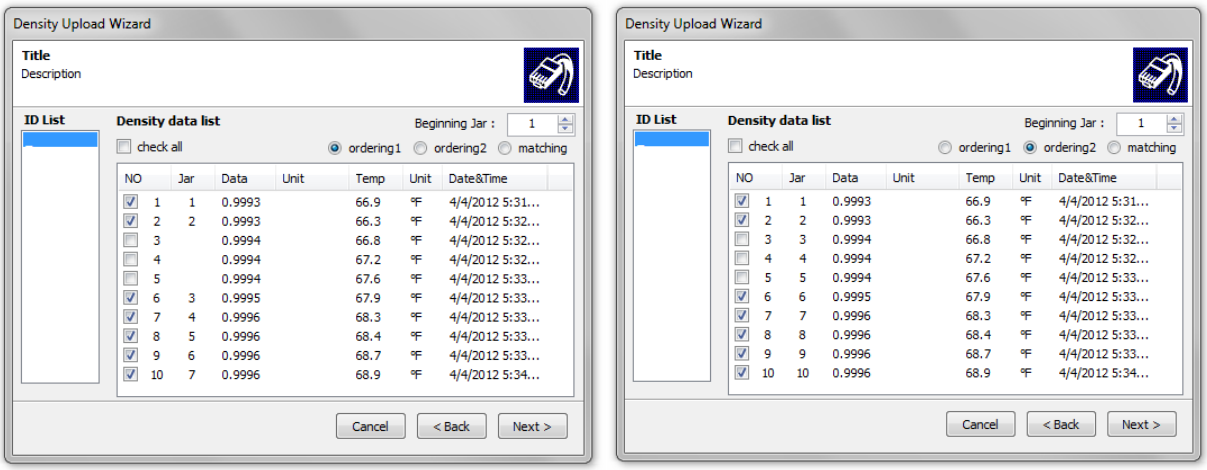




9.3.1 Finalizing the S.G. Transfer

1. Download Options: There are several options for how the measuring results can be put into the software.

- **A.** You can select the beginning jar. (i.e. If setting the beginning jar as 5 then S.G. result 1 will correspond to the 5th jar in the bank.)
- **B. Ordering 1:** Jar number increases by 1, skips unchecked boxes. (i.e. If you uncheck No. 3-5, then then No. 6 will become jar 3.
- **C. Ordering 2:** Jar number increases by 1, even if there are unchecked boxes or missing test numbers.
- **D. Matching:** Test number and jar number stay the same, even with unchecked boxes or missing results.

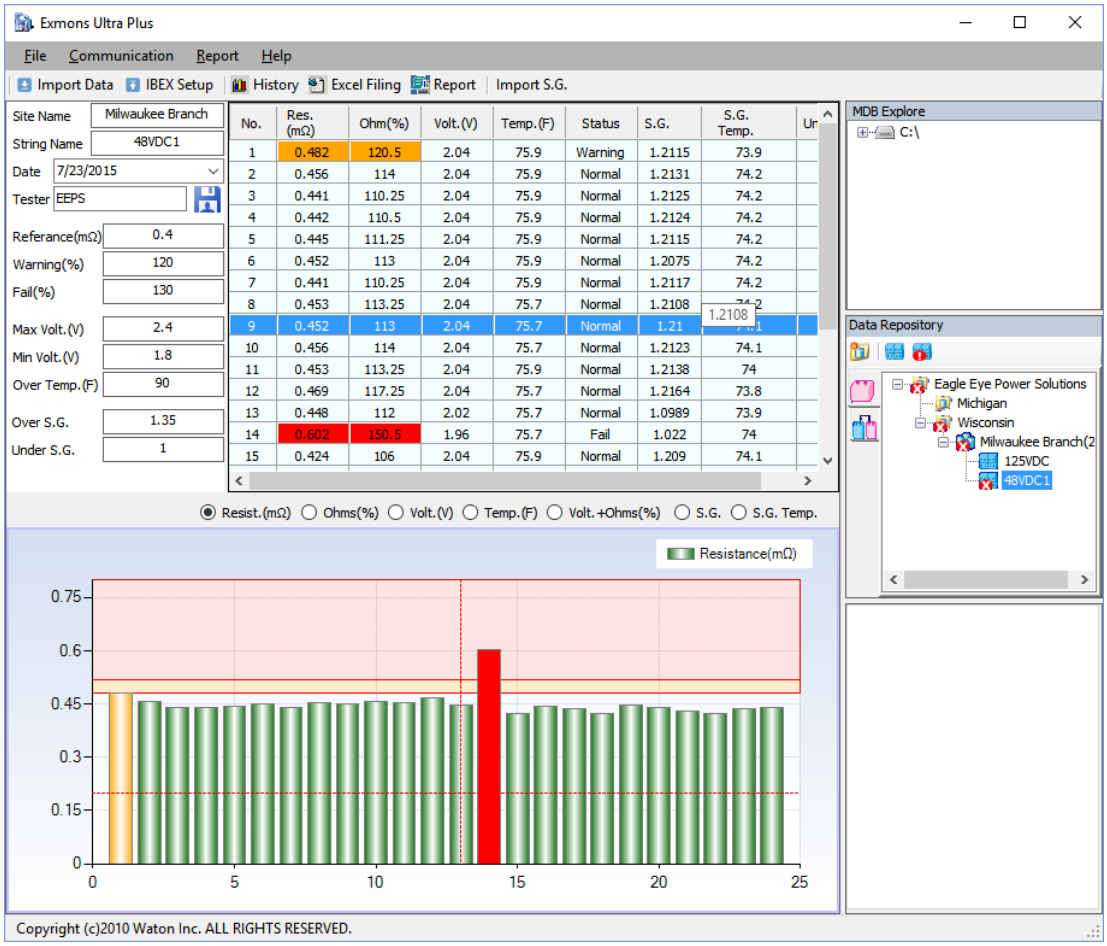


9.4 Viewing Bank Data

1. If not uploading specific gravity double click the bank you wish to view. Each bank can contain multiple dates with the most recent shown by default.

2. Data View:

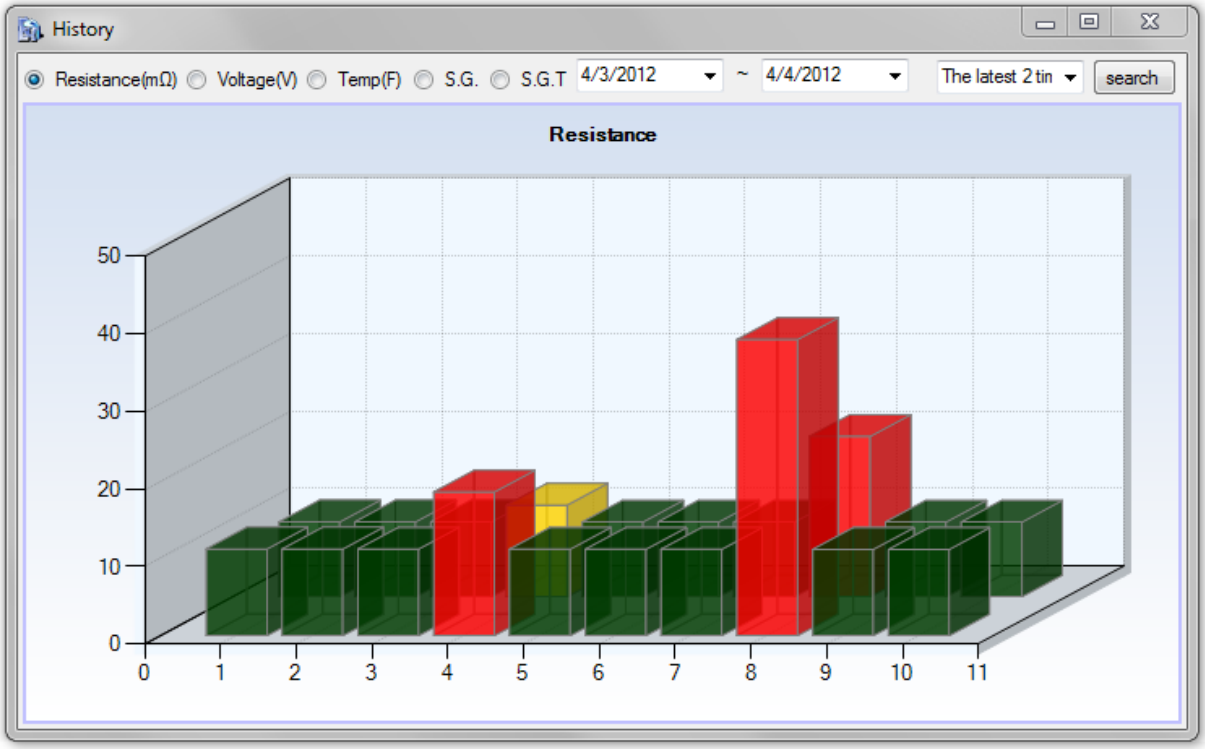
- **A.** Bank information displayed here. You can select different test dates by using the “Date” drop-down menu.
- **B.** Measuring data for bank. Scroll the mouse wheel here to scroll through different test dates.
- **C.** Data graph, select different values to see them displayed on the graph. The yellow region indicates the warning zone and the red indicates the fail zone.



3. Viewing History: Click History to view the bank history. You can select a date range; the results will appear on the graph showing the earliest test date first after clicking the "Search" button.

5. Click Excel filing to save the test data as an Excel file.

6. Click Report to generate a report. See page (11) for more details.



9.5 Generating a Report

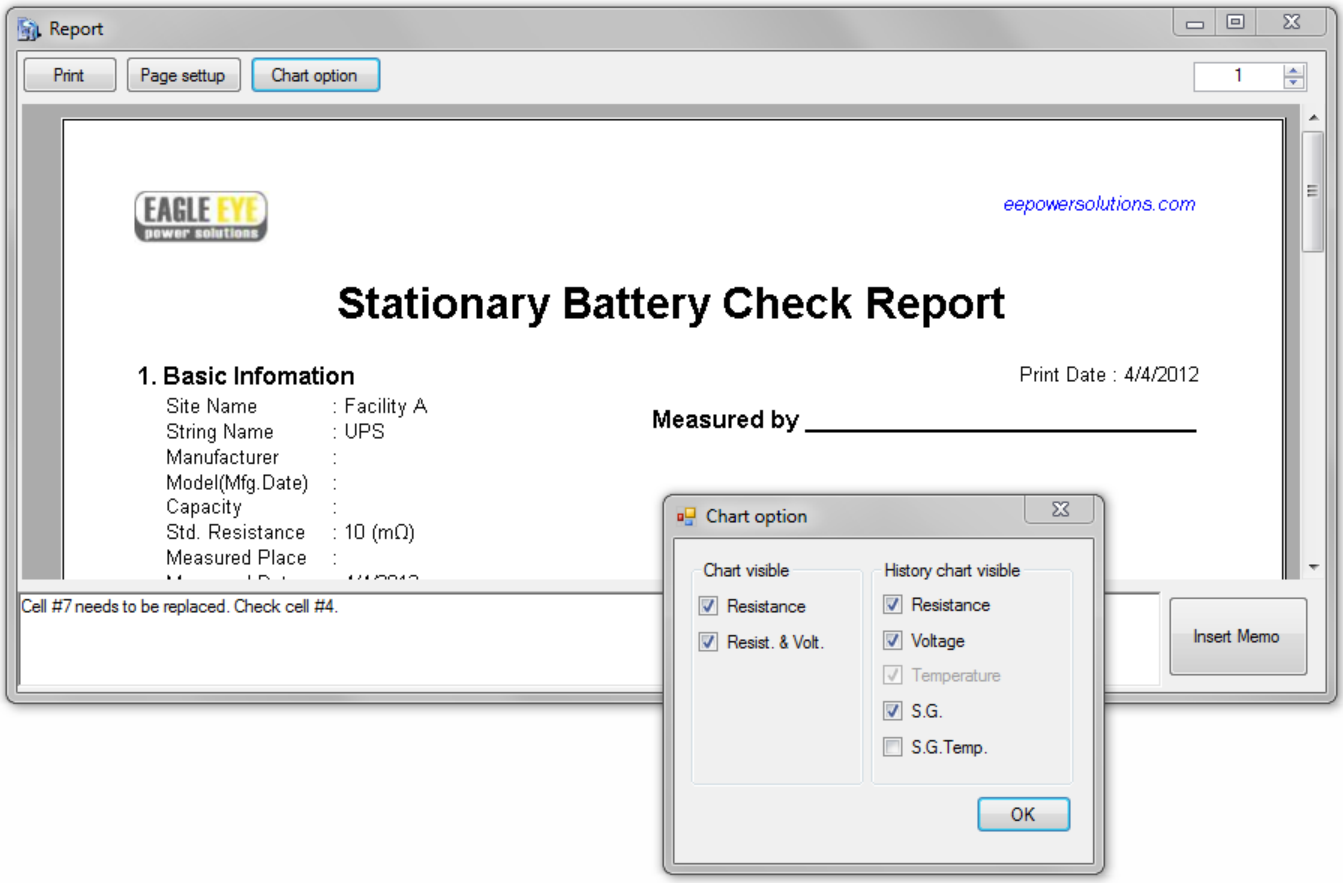
1. Two types of reports can be made in Exmons Ultra+.

- **A. Standard Report:** To generate a standard report click the Report button when viewing a bank or select “Report” on the main menu then select “Standard Report.” The standard report shows all of the test data and all of the individual cell data.
- **B. Warning Report:** To generate a warning report select “Report” on the main menu then select “Warning Report.” This report is the same as the standard report except it only lists the cells which are either in warning or fail status.

2. Viewing: Scroll through the report pages by clicking the up or down arrow.

3. Report Options: You can choose which test data graphs will appear on the report. Click “Chart Option” to select the measuring units that will appear on the report. (i.e. If you uncheck S.G. Temp it’s graph will be omitted from the report.)

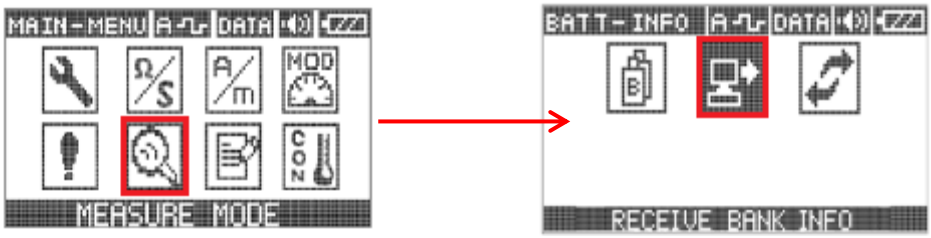
4. Printing and Saving: You can print or save the report by clicking the print option. If you have Adobe Acrobat Pro you can print the report to PDF file. (NOTE: Any print-to-PDF program will work for saving the report.)



9.6 Uploading Bank Information and Alarms to the IBEX

1. Connect the IBEX and turn the unit on. Press the “IBEX Setup” button in the software.

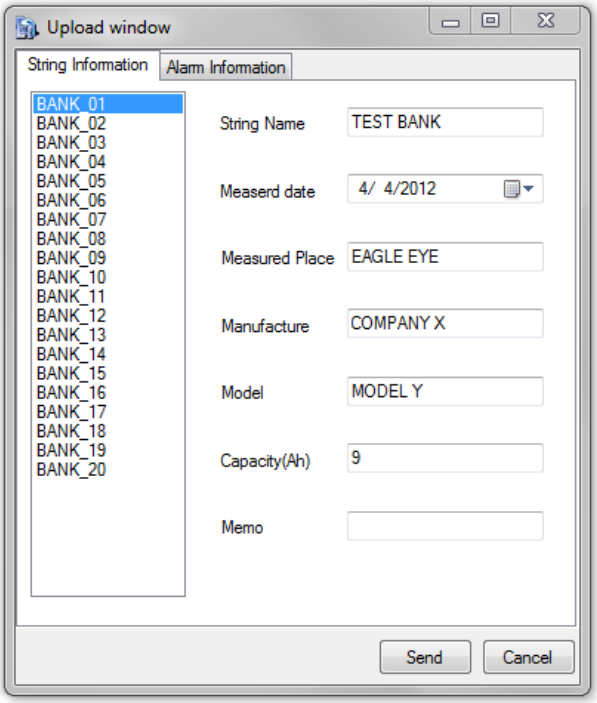
2. The data transfer window will appear. On the IBEX press [MENU] and scroll over to “BATT INFO” then scroll over to “RECEIVE BANK INFO” and press [ENT].

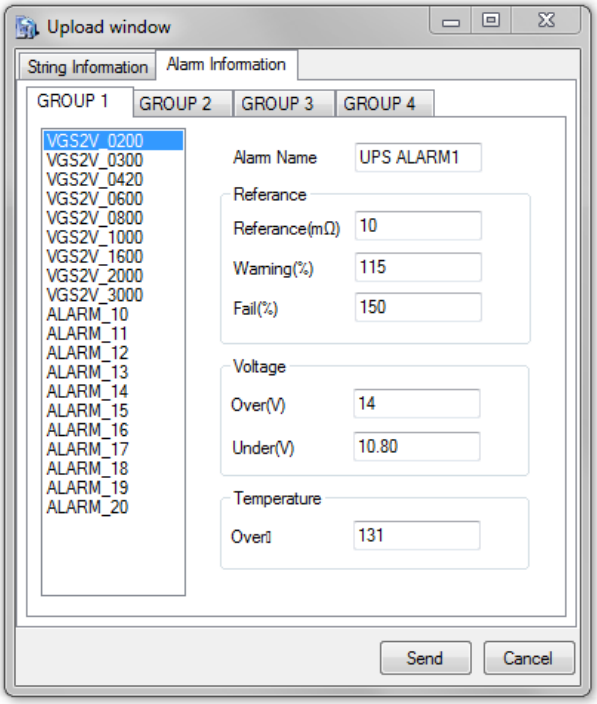


3. A window will appear allowing you to modify Bank Information or Alarm Setting. Editing these settings in the software is much quicker than entering them manually on the IBEX.

A. Bank Information: Select the bank you wish to edit. Upon clicking “Send” the bank information on the IBEX will be updated.

B. Alarm Settings: Select the group you wish to edit. Group names must be edited on the IBEX. In each group select the alarm you wish to edit then click send to save it to the IBEX



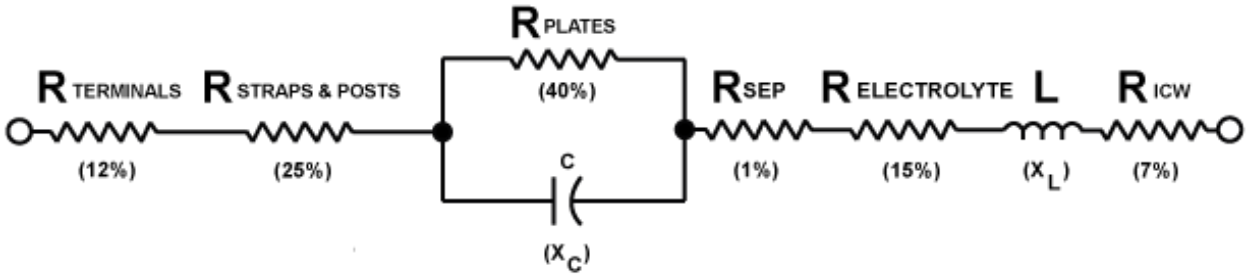


10. Concept of Stationary Battery Measurement

In order to examine the extent of deterioration of the measurement materials (e.g., stationary batteries that tend to increase their internal resistance as they get older), it is necessary to measure voltage sags by an internal resistance, $V_{IS\ (below\ voltage)}$, and by connecting parallel current, I_S, to the terminals of the measured objects to calculate the internal resistance value. A theory that uses the outcome obtained by such procedures to diagnose the status of stationary batteries is well-established and internationally recognized. (Refer to IEEE STD. 1188 and 484.)

10.1 IEEE Std. Recommendation

Battery resistance breakdown:



1. 40% (Pole plate resistance): **Electrochemical resistance typical to pole plates** (changes according to the extent of corrosion of the pole plate)
2. 25% (contact resistance): Resistance against contact points of the pole plate
3. 15% (electrolyte resistance): Resistance due to the ion conductivity of electrolyte (varies by the measuring frequency)
4. 12% (contact resistance): Interconnect resistance due to poles and bus-bar. According to the degree of the pole plate corrosion, the deterioration will be progressed into pole plate resistance (40 percent) and electrolyte resistance and capacitive reactance (Xc) will be changed according to the measuring frequencies.

10.2 Concept of Internal Resistance and IEEE Std. Recommendation

The relevant stipulation of the IEEE Std. 1188/485 specifies that "**As the heightened vale of the cell's internal resistance indicates a major change in a cell's characteristics, by measuring the internal resistance of cells, it is possible to check the problem of cells thereby recognizing the low-performance cells**."

In other words, as the stationary battery's equivalent circuit characteristics is R-L-C serial/parallel circuit, if we know the difference of the size of internal resistance (①+②+③+④), it is possible to evaluate the status of change in a stationary battery characteristics (deterioration).

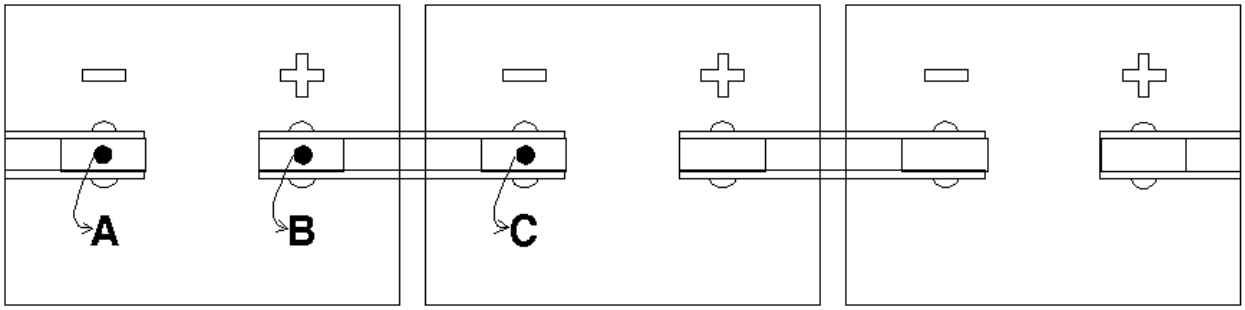
10.3 Securing Accuracy and Discrimination While Measuring Example

The high capacity (Ah) stationary battery has a very low internal resistance value around 10mΩ~0.1mΩ and 10 percent of it, or 0.01mΩ, is of extremely low value. Therefore, it is important to fully understand the measuring methods and do it accurately. In addition, since it is necessary to measure the internal resistance of each cell in a floating charge state where UPS/stationary battery power is impressed, it is compulsory to use a specially designed tester to measure the internal resistance value accurately.

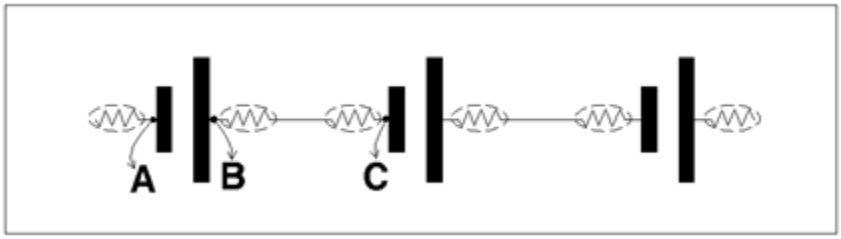
Stationary Battery types	Measured values	10% value	remarks
12V/ 100AH	3.7mΩ	0.37mΩ	The value is large enough be measured by less precise testers.
2V/ 2000~4000AH	0.2mΩ	0.02mΩ	**Since the measured value is very small, the pole conductor resistance and contact resistant play a key role in determining the measured value error.**

In general, the internal resistance value expressed in "mΩ" is the internal resistance value measured by the internal resistance measuring method recommended by the above IEEE Std. 1188/484.

10.4 The Internal and Interconnect Resistance during Stationary Batteries Measurement



In order to measure an accurate internal resistance value of the stationary battery, it is necessary to locate the point A (-) as close as possible to the point B (+) terminal and always measure the same location.
Because the internal resistance value of the stationary battery is so minuscule, it is necessary to minimize the external influence from the surrounding environment (mainly, contact resistance).



Albeit minuscule, cables or bus bars used for interconnecting the stationary battery cell terminals also have resistance values so as the connecting lines (contact resistance). To measure the interconnect resistance in order to check the contact status of the stationary battery terminal and connecting lines, measure **point B and point C**.

When interconnect resistance is extraordinarily high, it may lead to voltage sag, which can bring about a decrease in discharge capacity. Furthermore, it will produce a heat due to contact resistance of connection parts. Repair the bad connection as soon as possible.

11 Specification

Model: IBEX-PRO / IBEX-ULTRA
Measuring Range
- Stationary battery 10Ah~ max. 6,000Ah , 0.1 Volt ~ 16.0 Volt DC

Accuracy
- Voltage; ±0.5%
- Temperature: within ±2% (-20-+ 80°C)
- Internal resistance: within ±1.0 % rdg. ±8dgt. (3milli ohm full-scale) across test range

Resolution
- DC voltage: 10㎷
- Internal resistance: 0.001mΩ
- Temperature: 0.5℃

Recognizable speed during automatic measurement: within first 4.0 seconds (the measuring data will be corrected every two seconds)

Other available functions
- Auto scaling functions
- Zero-point adjustment function
- USB serial port

Measuring data storage capacity
- Choose from 15 different modes including

IBEX-PRO	IBEX-Ultra
600cells Max.	4,800cells Max.

Alarm setting files

IBEX-PRO	IBEX-Ultra
4	80

Exterior size and weight (excluding the measuring lead)
- 95W× 42D× 175H, less than 650g (including internal battery)

User Programmable
- Over/Under voltage alarm setting
- Fail/Over impedance alarm setting
- High temperature alarm setting
- Display menu

Communication Protocol: Binary or standard ASCII text
Data format: Excel 2000/2002/2003 and Windows 98/2000/XP/Vista/7 compatible
Built-in battery: Li-ion Battery (1,950mAh~2,400mAh, 11.1V)

12. Warranty Policy and Limitations

Eagle Eye Power Solutions warrants to the original purchaser all of its original products against faults in materials and workmanship under normal use for the time period as described below in article No. 5 of section II. Warranty Limitations from the date of BL (Bill of Landing) pursuant to this warranty policy.

Eagle Eye will, at its discretion, repair or replace free of charge, each product or part returned thereof.

12.1 Return Merchandise Authorization (RMA)

Before returning products to Eagle Eye Power Solutions an RMA number must be issued. Contact Eagle Eye to start the RMA process.

12.2 Warranty Limitations

Eagle Eye Power Solutions does not cover products that have been received physically damaged, altered, or improperly packaged. Products will be inspected upon receipt and the examples of warranty limitations are as follows:

1. Eagle Eye has no liability for general, consequential, incidental, or special damages. These include loss of recorded data, the cost of recovery of lost data, lost profits, and any inspection; testing caused by any defect or by the repair or replacement of products arising from a defect in any product and/or parts.

2. Eagle Eye will have no liability for any product returned if Eagle Eye determines that:
   - The product was stolen from Eagle Eye or the product was not sold to you as new.
   - The asserted defect is attributable to misuse, alteration including removing external covers (unless authorized to do so by Eagle Eye), accident or mishandling while in the possession of someone other than Eagle Eye.

3. This limited warranty does not cover static damage and over-voltage on product by misuse.

4. Eagle Eye warranty does not cover following damages:
   - No seal (non-authorized recovery sticker), torn, or punctured.
   - Loose, damaged, or missing screws.
   - Serial number on external rear cover does not match with Eagle Eye records.

5. The warranty period shall be applied to the following product and/or parts.

Part of IBEX	Period
IBEX-body	12 months
Li-ion battery	6 months
Probes & other accessories	3 months

6. Eagle Eye is not responsible for any failure to render due to fire, flood, other acts of god, or causes beyond its control.
7. If Eagle Eye determines that the failure was caused by misuse, alteration, accidental or abnormal condition of operation or handling, purchaser will be billed for the repaired product, and the cost to have the unit returned by freight will be added to the invoice.

13. Contact Us

If you have any questions or comment, please contact Eagle Eye Power Solutions. You can reach our team any of the following ways.

Phone: 1-877-805-3377

Email: info@eepowersolutions.com

Website: eepowersolutions.com

Fax: 414-962-3660

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6306 Eastwood Ct.
Mequon, WI 53092