



BDL-Series

BDL-SERIES

BATTERY DATA LOGGER

User Manual V1.1



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1. Introduction

The intent of this manual is to provide the necessary information required to safely and effectively operate the Eagle Eye Battery Data Logger (BDL-Series). Please read the manual carefully to obtain maximum performance of the test equipment and its accessories.

⚠ Warning: Read this manual completely before using the Eagle Eye BDL-Series to avoid possible damage caused by improper use of the equipment.

1.1 Overview

The Eagle Eye BDL-Series is designed for data logging of battery cell voltage, string voltage, current and ambient temperature. It can be used individually to reflect battery status or used together with Eagle Eye's SLB-Series load banks. The BDL is incredibly diverse with the capability to cover a variety of battery system configurations with voltage ranges from 12V to 800V.

Features

- Modular design allows for increasing monitor capabilities on as needed basis
- Ease of installation and operation
- Compatible with many battery types including 1.2V, 2V, 6V and 12V styles
- Wireless RF communication between battery string and PC software
- Simultaneously monitor cell voltage, string voltage, current and ambient temperature
- Data auto saving in PC, no need for data transfer
- Individual operation to reflect different aspect of battery status
- Compatible with Eagle Eye SLB-Series load banks for discharging capabilities
- Suitable for an array of battery systems, including common nominations such as 12V, 24V, 48V, 125V, 240V, 380V, 480V
- Each DAC is connected with multiple batteries to aid with setup time. The exact amount is dependent upon battery voltage type and will either connect to 12 or 4 batteries per DAC
- Could be used as temporary voltage monitoring or as permanent battery monitor
- DACs are powered by battery, no need for extra power supply
- User-friendly Eagle Eye Dataview software for battery recording and testing data management comes standard with each kit



1.2 Technical Specification

Item	Testing range	Accuracy
Cell voltage	0~16V	±0.5%
String voltage	0~800V	±0.5%
Current testing	0~1000A	±1%
Temperature measurement	-25~55°C	±1°C
Power supply	Cell DAC	DC12V±15% Supplied by battery
	String DAC	DC12V±15% Supplied by battery
	Wireless communication modular	DC5V±5% Supplied by PC via USB
Monitoring software	Eagle Eye software with data management function	
Communication mode	FSK	
Communication distance	100m (not blocked)	
Communication frequency	433MHz	
Weight	0.15 kg/per DAC	
Size	121×113×40 mm	
Warning for	Communication disconnection, Over voltage, and Low voltage	
Working environment	Temperature: 0~55°C Relative humidity: ≤85%RH	
Data sampling interval	0.1 second/point	
Safety standard	CE	



1.3 Composition

Standard Eagle Eye BDL-Series kit is composed of the following parts:

Cell DAC (Data Acquisition Case) is for monitoring voltage of each cell. With 2 color coded serial ports, each cell DAC is connected with 4 cells of 12V (or 6V) or 12 cells of 2V (or 1.2V). For different battery systems, number of cell DACs will vary accordingly. For example, in a 48V system in telecom the BDL will need 2 Cell DACs if it is 24 cells of 2V. Cell DACs are powered by batteries with $DC12V \pm 15\%$. With built-in wireless communication module, value of cell voltage could be received directly in PC.

String DAC is for monitoring string voltage, string current and ambient temperature. Each String DAC will come with a customized current sensor for testing string current and is connected with the main POS and NEG ends of the battery string. Each BDL kit will only need ONE String DAC which also includes built-in communication module for wireless communication.

Communication terminal and RS232-USB converter

The communication terminal is connected with your computer via a provided RS232-to-USB converter. With the communication terminal the Dataview software will receive and record monitoring data from the BDL system.

2. DAC Wiring Connection

General Warning

For security reasons, please pay extra attention to the following points before connecting:

- 1) To avoid explosion/injury DO NOT work in an environment with flammable, explosive, materials and gases.
- 2) Be careful when connecting the voltage testing leads to avoid short circuit shock.

2.1 Cell DAC Connection



Each DAC has 2 serial ports for connection with DAC serial cables. These 2 ports are labeled with 1 and 2 which are connected with red (#1) and black (#2) connectors of DAC cable. They are for connecting with different series of batteries in a string. For detailed way of connection, please refer to the text below.

Besides the standard DAC options, Eagle Eye provides custom DAC's for unique applications

- 1) For battery type of 4V, the connection is same as 2V. One DAC for 12 cells.
- 2) For battery type of 12V ONLY (e.g. 380V UPS system), way of connection is same as that of 2V. One DAC for 12 cells.

*These DAC options need to be specified at time of order.

Please see pictures for further illustration of data acquisition lead types:

 <p>Fig 2.2.2A</p>	 <p>Fig 2.2.2B</p>
<p>7-lead, 1 black and 6 red for testing 1.2V and 2V batteries One cable is connected with 6 cells One DAC is connected with 12 cells</p>	<p>3-lead, 1 black and 2 red for testing 6V or 12V batteries One cable is connected with 2 cells Once DAC is connected with 4 cells</p>

NOTE: All cell DACs have been programmed according to an assigned number represented by the associated DAC label. When connecting DAC with batteries use them in the order of the numbering. DAC 1, DAC 2, etc.

Cell DAC Connection with Batteries

Regardless of the battery system numbering, *make sure that DACs are always connected with battery string beginning from the most **negative terminal***. This is important for proper DAC functioning and will enable the PC software to display the corresponding battery values.

Notes:

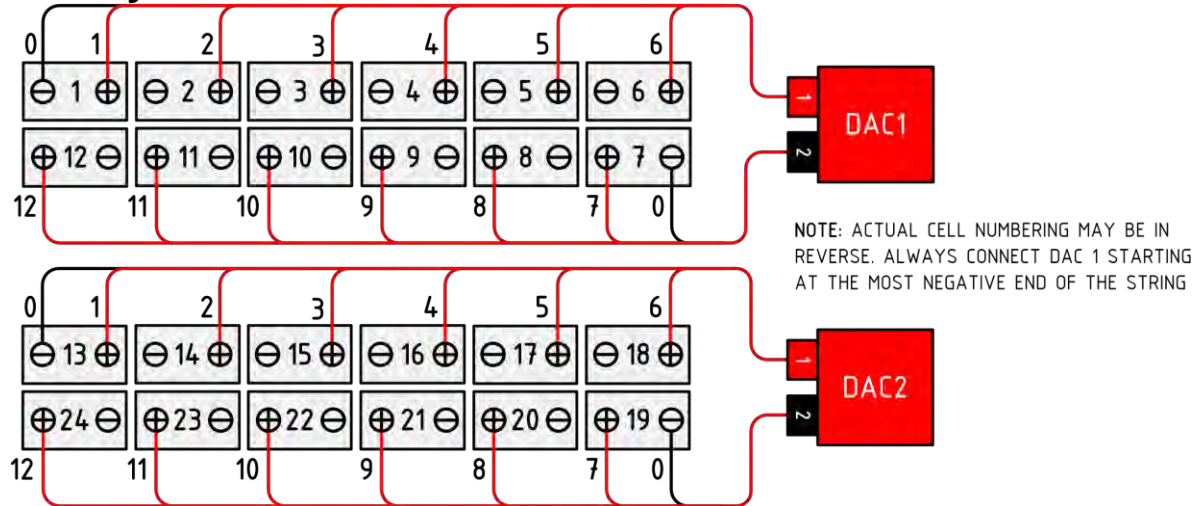
- Always start with DAC1, connecting it to the most negative post of the battery string
- DAC's have (2) serial ports labeled as 1 & 2
- Connect DAC cable 1 (red serial connector) to DAC port 1
- Connect DAC cable 2 (black serial connector) to DAC port 2
- WARNING: Be certain that the cabling and alligator clips are properly connected to the batteries BEFORE making the final (serial) connection to the DAC
- If the connection is improper (i.e. incorrect sequence, etc.) it may result in the DAC being damaged

2.2 DAC Connection to 1.2V/2V/ (4V special order DAC) Cells

- For 1.2/2/4V cells, use 7-Lead DAC cables
- Start with DAC cable 1 (red serial connector)
- Connect the black alligator clip (labeled 0) to the most negative post of the battery string
- Connect the red alligator clips (each labeled 1-6) to the next (6) positive posts
- Next use DAC cable 2 (black serial connector)
- Connect the black alligator clip (labeled 0) to the negative post after the previous cell connection
- Connect the red alligator clips (each labeled 7-12) to the next (6) positive posts
- Repeat connection pattern for additional DAC's

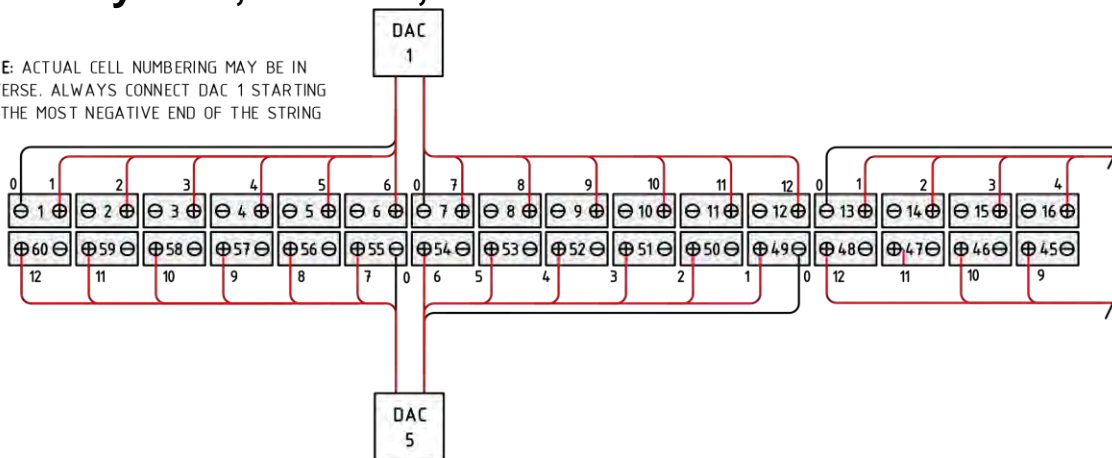
Common system connections:

48V System - 2V Cells - 24 Jars



125V System, 2V cells, 60 Units

NOTE: ACTUAL CELL NUMBERING MAY BE IN REVERSE. ALWAYS CONNECT DAC 1 STARTING AT THE MOST NEGATIVE END OF THE STRING

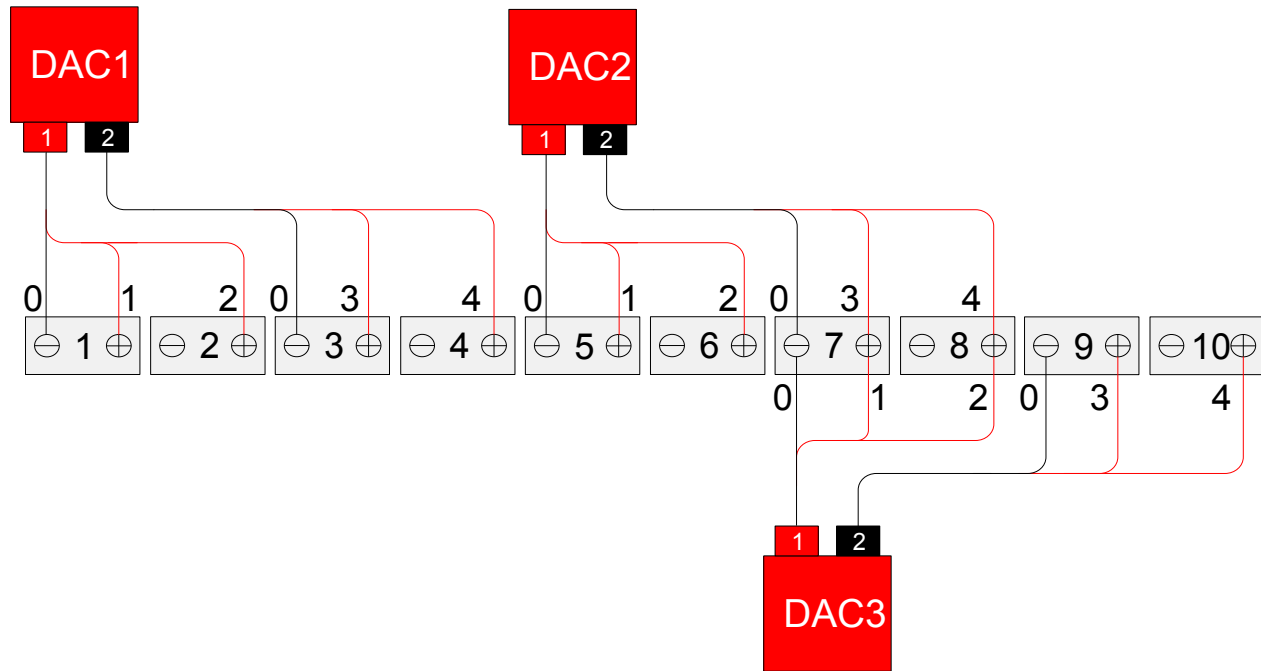


DAC Connection to 6V/12V Cells

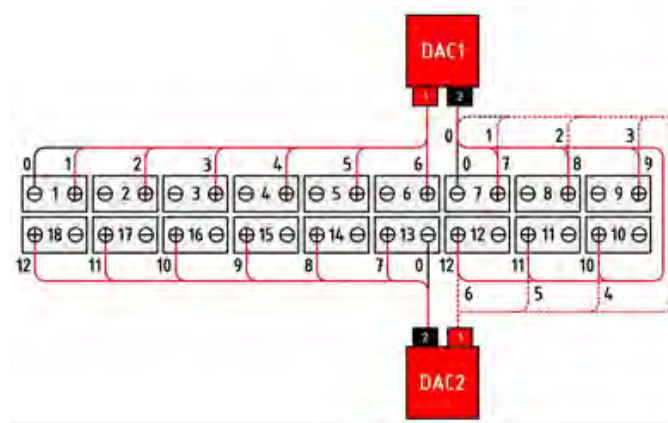
- For 6V/12V cells, use 3-Lead DAC cables
- Start with DAC cable 1 (red serial connector)
- Connect the black alligator clip (labeled 0) to the most negative post of the battery string
- Connect the red alligator clips (each labeled 1 & 2) to the next 2 positive posts
- Next use DAC cable 2 (black serial connector)
- Connect the black alligator clip (labeled 0) to the negative post after the previous cell connection
- Connect the red alligator clips (each labeled 3 & 4) to the next (2) positive posts
- Repeat connection pattern for additional DAC's

Common System Connections

125V System 12V Cells 10 Jars



If there are more than one DAC and the battery system ends with spare leads on the last DAC, connection of the last DAC will need to overlap with the previously connected DAC. The best method is to take Serial lead #2 (black connector) and start at the last cell of the system (the most positive) with #12 lead (for 7-point leads) or #4 lead (for 3-point leads) and work backwards towards the previous DAC until you have used all of the lead connections. Here is a visual example;



Notice with DAC #2; the #12 lead is connected to the most positive terminal and the user has worked backwards, eventually overlapping several leads of DAC #1.

2.3 String DAC

The case design of the string DAC is similar to the cell DACs with the exception that the serial connectors are different. The string DAC connectors consist of 1 male and 1 female RS232 connector, whereas the cell DAC design consists of 2 female connector harnesses.

Both of the String DAC harnesses are also different from cell DAC harnesses because of their special functions: The female connector monitors the overall string voltage, while the male connector is used for power supply to the DAC, ambient temperature, and capturing the DC current.

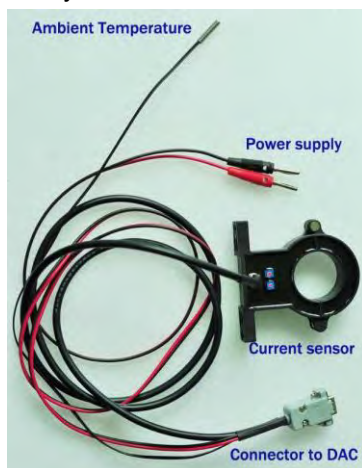


Connector 1

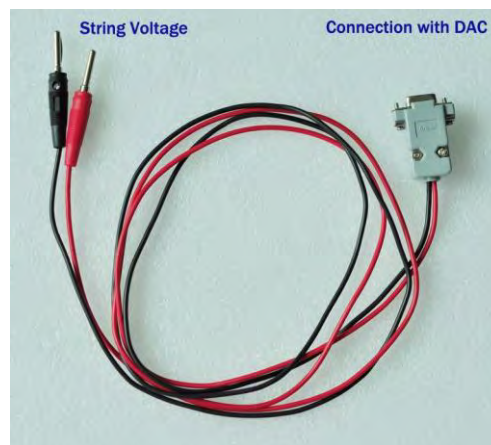


Connector 2

Functionality of each cable is shown in the pictures below:



Serial cable No. 1



Serial Cable No. 2

2.4 Connection of String DAC with Battery String:

Power supply

The string DAC is powered by batteries between (10.8V to 16V). For proper functioning, please connect power supply connector with batteries (e.g. one 12V cell or six 2V cells). When connected to adequate power supply the indicating light will blink.



Current testing

The current sensor (CT clamp) is sized to fit relevant battery capacity or current for each kit. The CT is able to be connected with the battery connection straps/busbars between cells. Usually, the CT should be connected on the negative side at the main system terminal.

Temperature measurement

The temperature sensor is used for testing ambient temperature. You could leave it free floating near the batteries or attach it to any object (e.g. certain battery) nearby for monitoring its temperature.

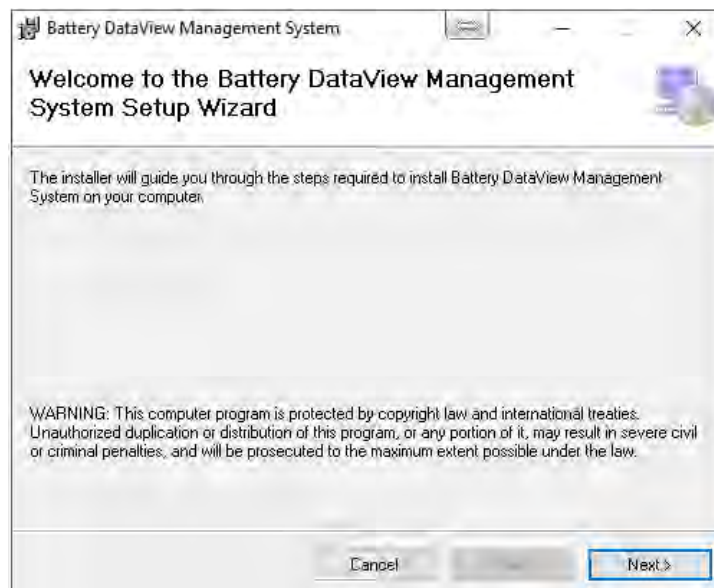
String voltage

The string connector is connected with two main posts of the battery string to monitor string voltage (overall voltage). The red connector goes with the positive post while the black connector connects on the negative.

3. Software Installation

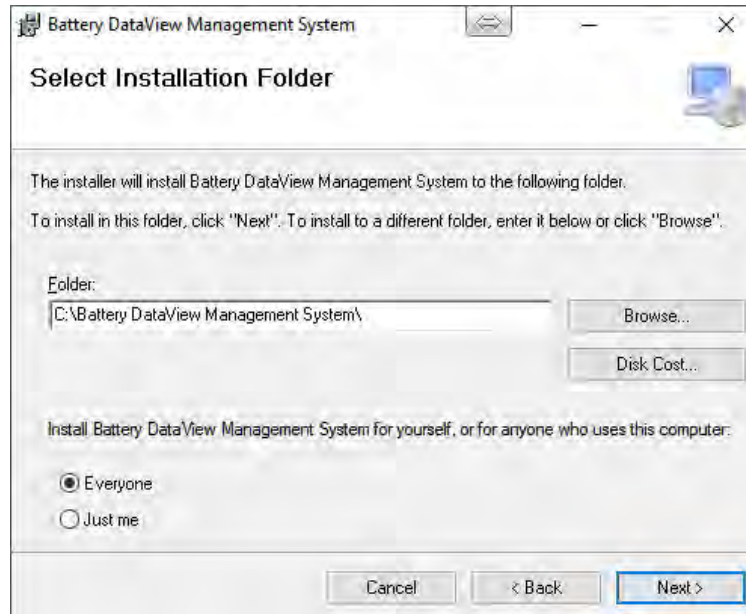
Insert your Eagle Eye USB drive that came with your SLB-Series load bank. On the drive you will find the installation program: Battery DataView Management System V4.3.41.msi

Right click and run install. The installer window will appear. Click Next & confirm installation.

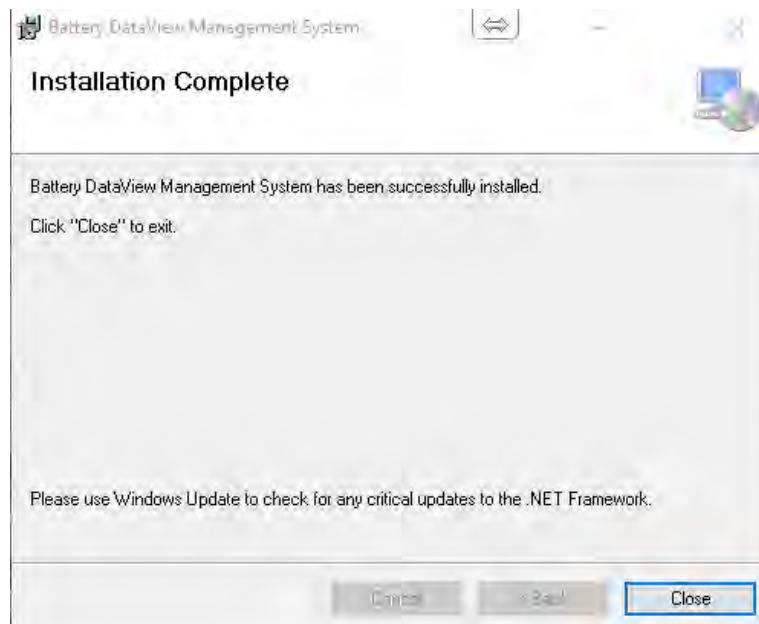




Select the desired installation folder.



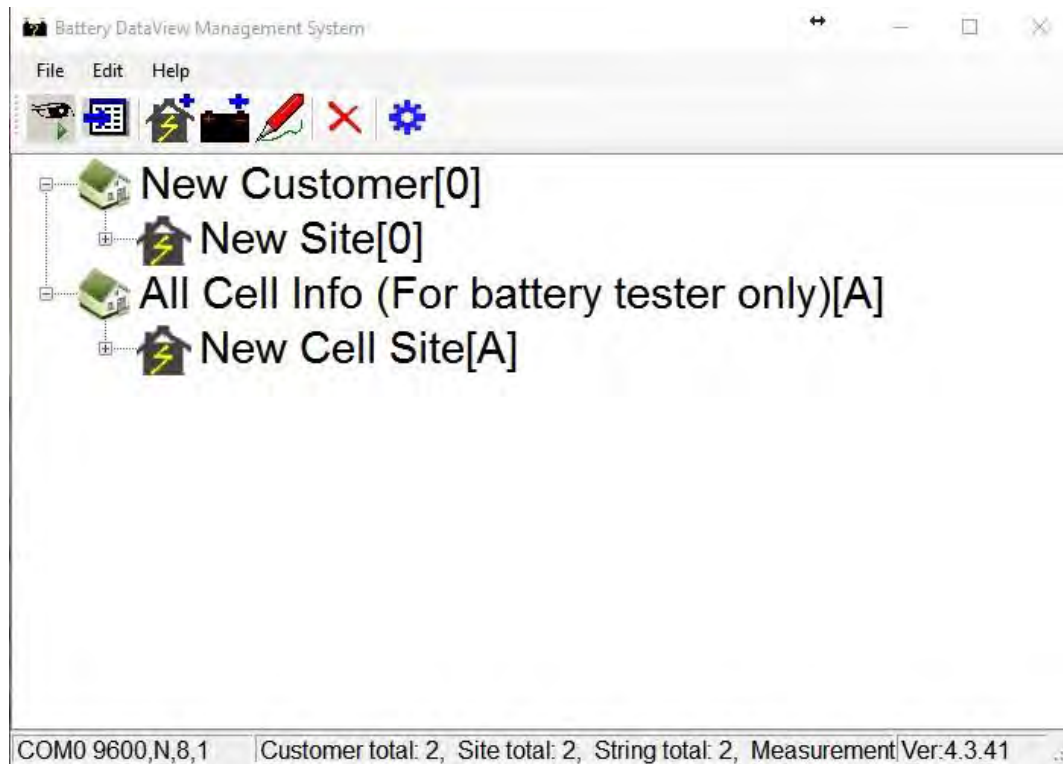
Once installation is complete you will close the installer.



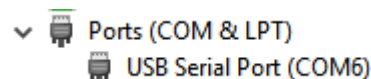


3.1 Preparing for Testing

Open the DataView Software.



Next, you will connect the Com Terminal to the PC using the provided RS-232-to-USB. Windows may auto install drivers for the device depending on your OS version and security settings. To verify if the drivers have successfully installed go to Start < Device Manager. In Device Manager, if the drivers are installed the Com Terminal will appear under Ports as a USB Serial Port with an assigned com number. In our example the assigned com is 6. Note: Your device assigned Com Port may be different.



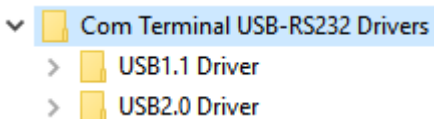


A simple method to determine if the device is on this list is to unplug the USB cord from the PC and then plug it back in. It will disappear & then reappear in the device list. If the device did not properly install (it's not listed in the ports or does not have an assigned port number) you will have to manually install the drivers. When you locate where the driver is right click and select update drivers. You will receive a popup similar to this:



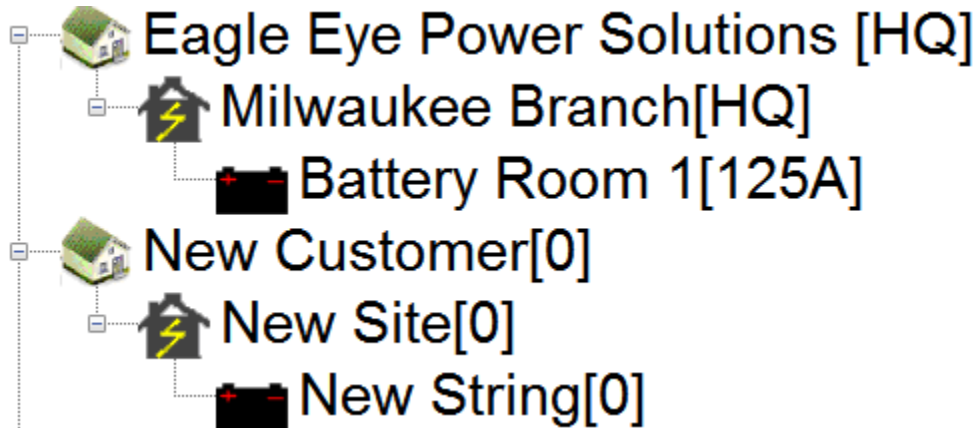
Select Browse my computer for driver software. Go to the USB drive from Eagle Eye.

Select the Com Terminal USB-R232 Drivers folder and press Ok. Windows will install the drivers.




You should now have an assigned Com Port.

Confirm the Com Terminal is powered on. In the DataView software, you will need to select "New String" or you can create your own string. As you see below we have created our own parent company, site, and named our battery string.

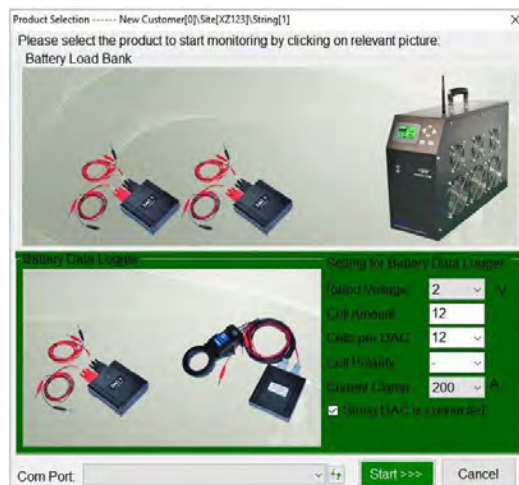


To add a company, go to Edit < Add Customer. Once you have created the customer you can select the newly made customer and “Add Site” in one of three ways;

1. Select the company, right click, choose add site
2. Select the  Icon
3. Go to Edit < Add Site

Once you have created your string or selected the New String option you can go to File < Start Monitoring or press the  icon.

A command box will appear. There are two options. You should click on the picture of your associated product (Battery Data Logger).



At the bottom you will see the Com Port selection bar. Select the Com Port assigned to the Com Terminal from earlier. If needed press the refresh to update the list.

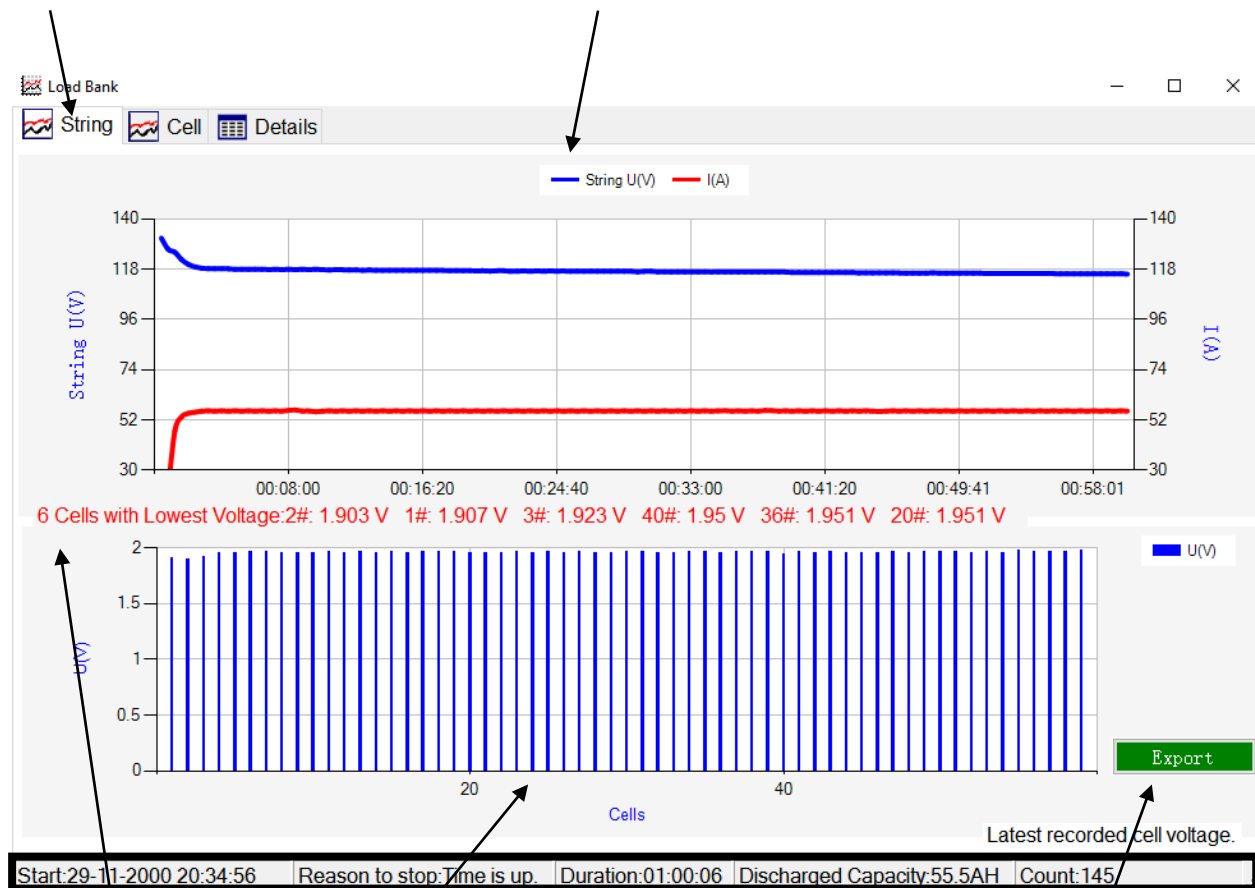


3.2 Live Monitoring

When the load bank begins testing the live monitor will show string voltage, discharge amperage, lowest 6 cells, and a chart with all cells on the home "String View" page. Right clicking on any graph allows for editing of the numerical values for that graph.

Viewing tabs

String voltage & discharge graph



Display of 6 lowest cells

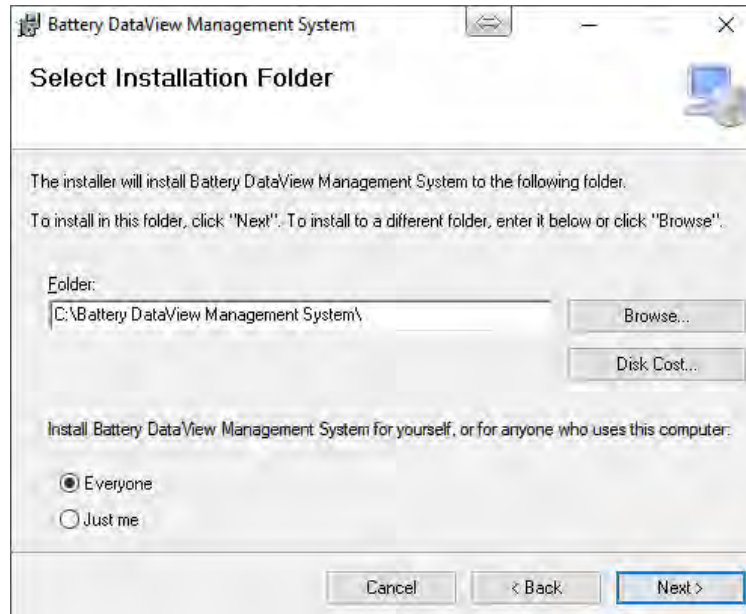
Cell values chart

Status bar

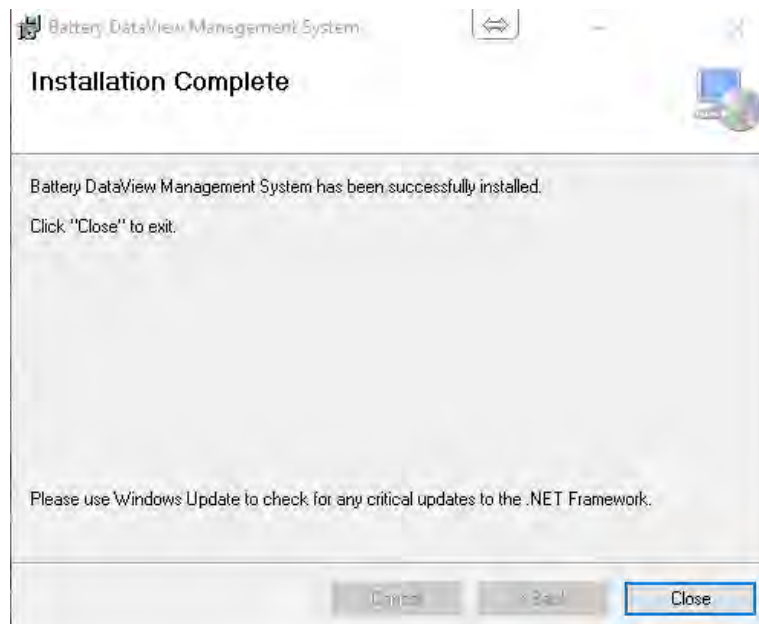
Exporting to Excel



Select the desired installation folder.



Once installation is complete you will close the installer.

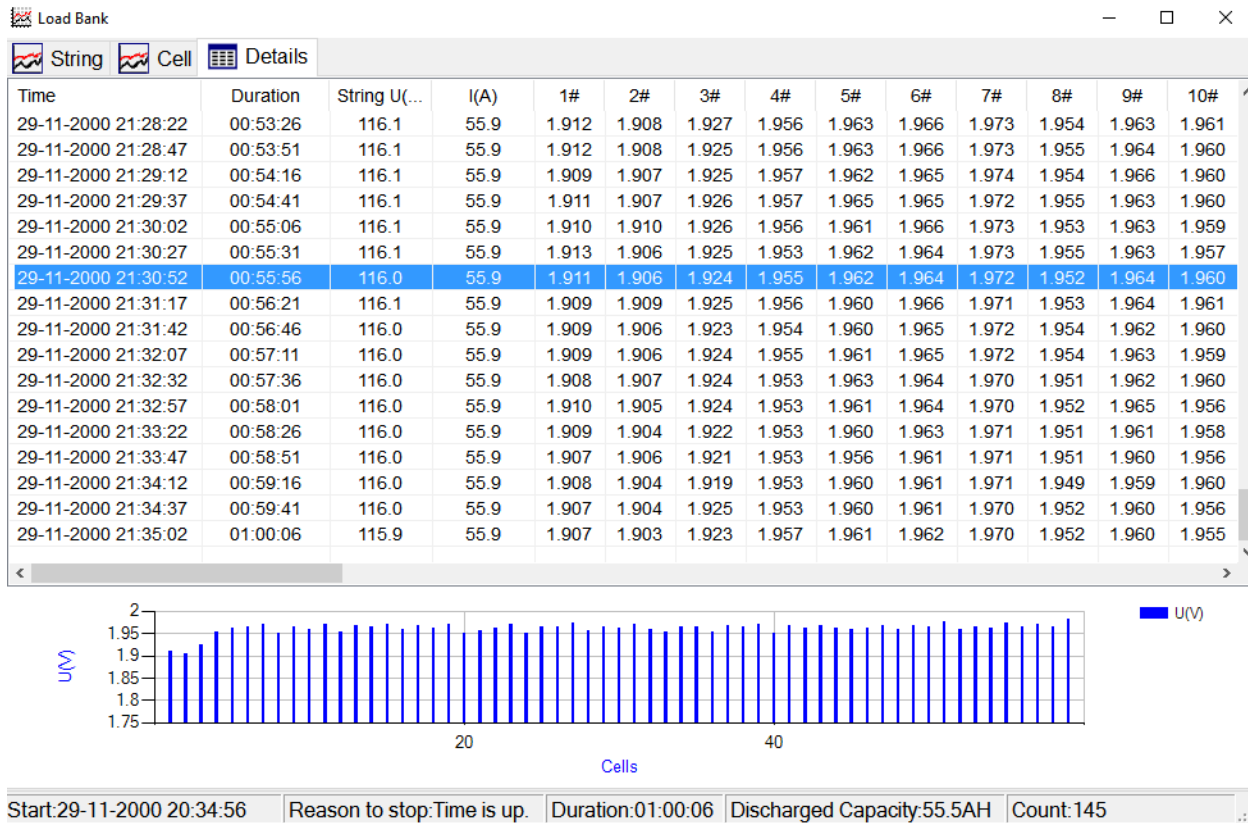





Detailed View lists the discharge data in numerical values at half minute intervals.

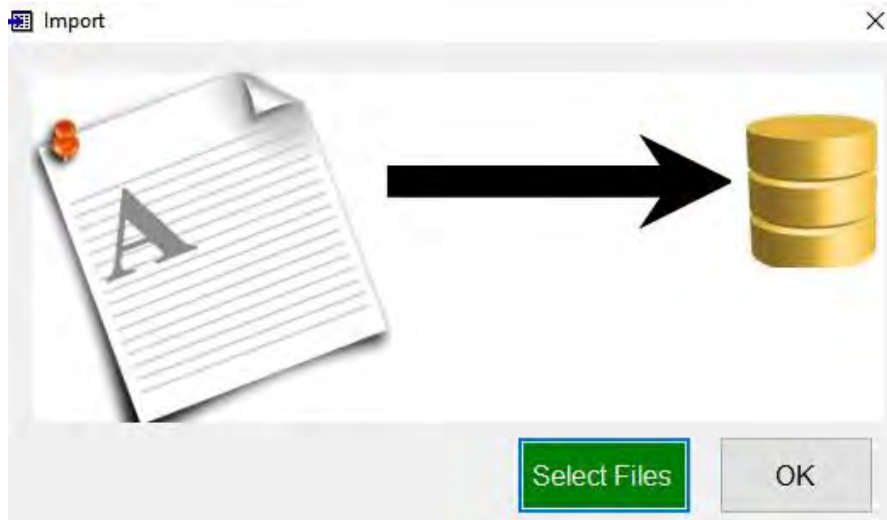
Values displayed; Time (date), Duration, String voltage, Discharge current, and each cell's voltage.

Selecting any data point will be reflected in the chart at the bottom of the screen. Hovering over any bar on the chart will display the corresponding cell number and its voltage value. The voltage axis lowest and highest value can be modified for viewing.

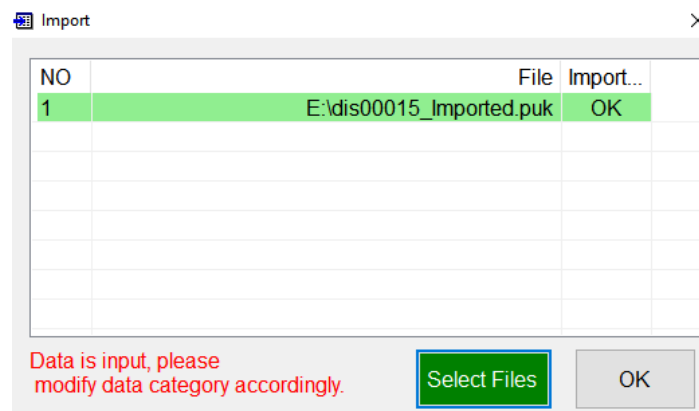


3.3 Exporting Data

With the DataView software either go to File < Import or click the  icon. The import box will appear;



Go to “Select Files” and find the USB drive on your computers directory. Once importing is completed you will see:



You can choose to select more files or press OK to complete the import.



Once imported, you will see the imported data on your list. Double click on the newly imported string and you will receive the test selection box;

The screenshot shows a window titled "DataView" with a close button (X) in the top right corner. At the top, there are two dropdown menus: "Eagle Eye Power Solutions [HQ]\Milwauk" and "String[487]". Below these is a table with the following columns: "Time of Test", "Duration", "Data Type", "From equipment", and "Remark". The first row of data contains: "29-11-2000 20:34:56", "01:00:00", "Discharge", "Load Bank", and "Import". There are several empty rows below the first one. At the bottom of the window, there are four buttons: "View" (green), "Export" (blue), "Delete" (red), and "OK" (grey).

Time of Test	Duration	Data Type	From equipment	Remark
29-11-2000 20:34:56	01:00:00	Discharge	Load Bank	Import

Select the test you wish to work with and then select either View – to view data, Export, or delete.

View data will bring up the Live monitor screens previously covered. Export will bring up a command box with time interval selection of either 15, 30, or 60 minute intervals.

The screenshot shows a dialog box titled "Set a time interval". It contains the text "Extract measurement data of every" followed by a dropdown menu showing "60" and the word "Min". Below this is a green button labeled "Export".

Once Export is selected an Excel file will be generated. **Note:** The user will need to have Microsoft Excel installed on the PC for the Exporting function to complete.