

Operator's Manual

DLV50 Data Logging Voltmeter *Plus*



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For the most accurate results, please read and follow these instructions carefully.

1.0 Overview

The DLV50 data logging voltmeters have been designed specifically for the battery test industry.

The DLV50 is designed to:

- Measure and automatically record DC cell voltages between 0.1 VDC and 19.999 VDC (inclusive)
- Upload and analyze hydrometer data (specific gravity & temperature) from DMA35 hydrometers

The DLV50 is capable of operating in (2) distinct measuring modes:

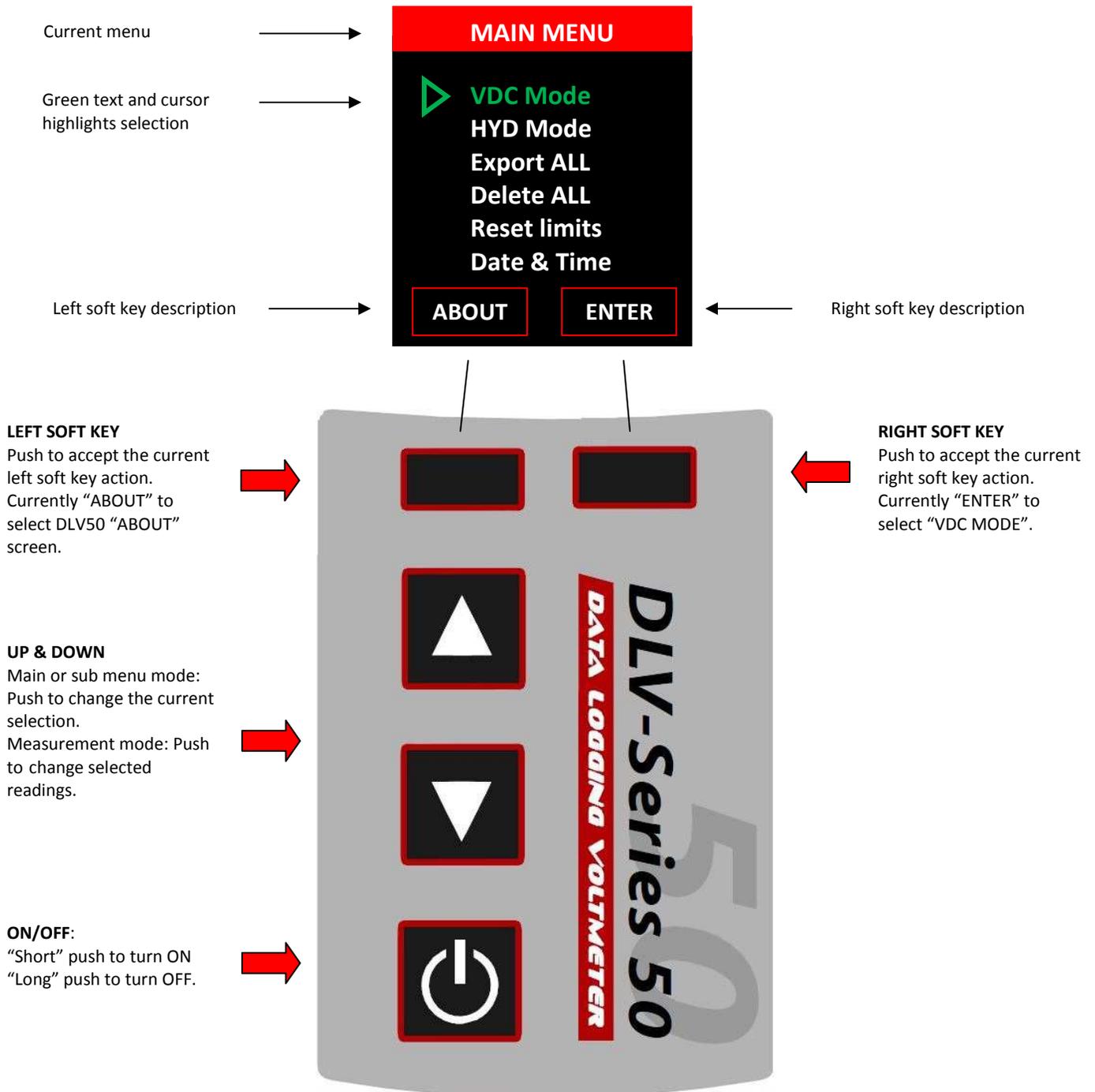
- (i) VDC Mode: The DLV50 can measure and store up to 2048 readings of cell voltages between 0.1 VDC and 19.999 VDC (inclusive). These readings are stored in 8 separate data strings of 256 readings, denoted A through H. The date and time of the last reading in each string is also recorded.
- (ii) HYD Mode: The DLV50 can receive and store up to 2048 readings of specific gravity and temperature from a DMA35 digital hydrometer. These readings are stored in 8 separate data strings of 256 readings, denoted A through H. The date and time of the last reading in each string is also recorded.

All stored readings can be downloaded via Winmeter 5.0 software to generate detailed test reports including statistical and graphical analysis and then stored into a custom database. This software communicates with the DLV50 via USB and allows the User to set the time/date, change modes, delete data string(s) and upgrade the DLV50 firmware via the PC interface. The readings can also be transferred to a USB flash drive in .bdf (Winmeter) format.

2.0 Menu System

2.1 Main Menu

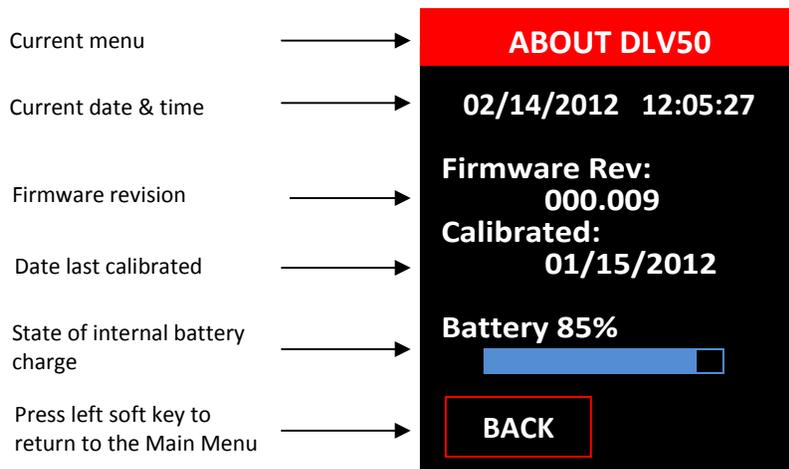
When turned ON, the DLV50 displays date, time and firmware revision for 3 seconds then displays the "Main Menu".



Regardless of DLV50 status, repeatedly pressing the left soft key will return the unit to the Main Menu (unless the DLV50 is connected to a PC via USB).

2.2 About Screen

Press the left soft key (below “ABOUT”) to display the “**About DLV50**” screen.



2.3 Main Menu Options

From the “**Main Menu**”, use the up/down keys to highlight the appropriate option then push the right soft key (below the “**BACK**” button) to select that option.

There are 6 options from the main menu:

VDC Mode: Select to view, analyze, edit or measure DC cell voltages. The DLV50 stores up to 8 strings of 256 readings stored in strings A through H.

HYD Mode: Select to view, analyze or upload additional strings of hydrometer reading from a DMA35 hydrometer. The DLV50 stores up to 8 strings of 256 readings stored in strings A through H. Both specific gravity and temperature are stored for each cell.

Export ALL: Select to export **all** strings of data (both voltage and hydrometer) to USB Flash drive.

Delete ALL: Select to delete **all** data in all strings (both voltage and hydrometer).

Individual strings can be deleted by selecting the “Delete String” option of the VDC or HYD mode sub-menu OR by connecting the unit to the Winmeter 5.0 software.

Reset Limits: Select to delete **all** high and low threshold alarm limits for voltage and hydrometer readings.

Individual limits for particular strings can also be deleted by selecting the “Limits” option of the VDC or HYD mode sub-menu OR by connecting the unit to the Winmeter 5.0 software.

Date & Time: Select to view and/or edit the DLV50 date and time setting.

The date and time setting is automatically synced with the PC date and time whenever the DLV50 is connected with the Winmeter 5.0 software

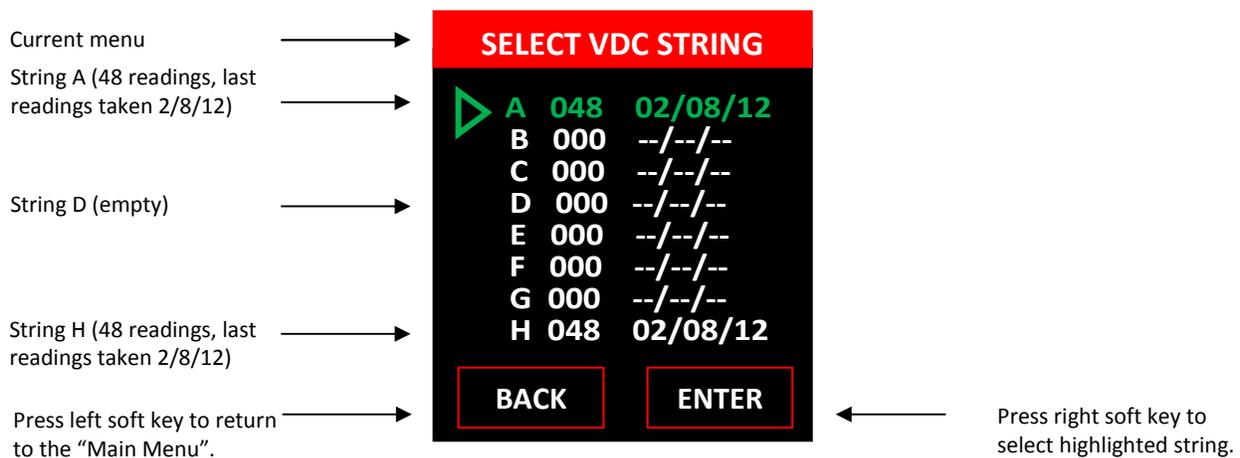
2.4 VDC Mode

To select VDC Mode, from the “Main Menu” use the up/down keys to highlight “VDC Mode” then push the right soft key (below “ENTER”) to select.

Select the “VDC MODE” to view, analyze, export to USB flash drive, print via IRDA, edit or add to stored DC cell voltages.

The DLV50 stores up to 8 strings of 256 readings stored in strings A through H.

Once “VDC Mode” is selected the user then selects which string (A through H) to open. Each string is displayed together with the number of contained readings and the date the last reading was taken.



2.4.1 Selecting a Voltage String

Use the “UP” & “DOWN” keys to highlight the required string then push the right soft key (below “ENTER”) to select/open the string.



Reading 001 “+2.023” is highlighted in blue to show it is below the low threshold voltage of string A. Reading 004 “2.423” is highlighted in red to show it is above the high threshold voltage of string A. Threshold levels are optional and editable.

To scroll through all voltage readings in String A, use the “UP” and “DOWN” keys.

2.4.2 VDC Sub-Menu

To enter the VDC sub-menu press the right soft key (below “MENU”).



VDC Sub-Menu Options:

Use the up/down keys to highlight the appropriate option then push the right soft key (below “ENTER”) to select that option.

There are 7 options to select from the VDC sub-menu:

[Add/Delete](#)

[Statistics](#)

[Graph](#)

[Limits](#)

[->Flash USB](#)

[->Print IRDA](#)

[Delete String](#)

2.4.2.1 Add/Delete:

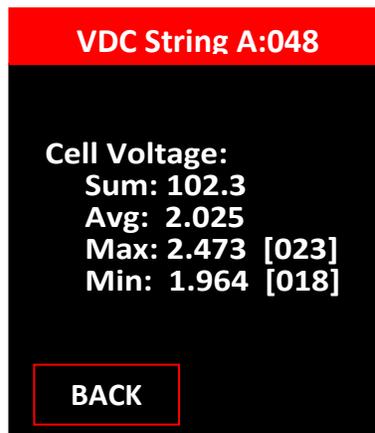
Select to measure/store, delete or insert DC cell voltages.



Refer to [Taking a DC Voltage Measurement](#) for additional instructions.

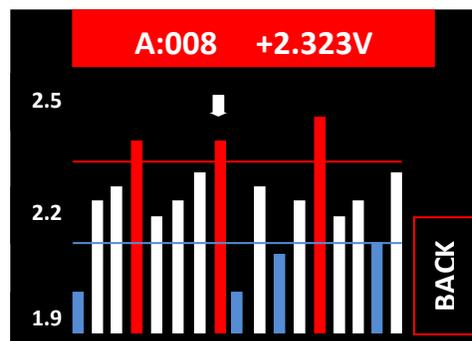
2.4.2.2 Statistics:

Select to view statistics for the current VDC string.



2.4.2.3 Graph:

Select to view graphical analysis of current VDC string.



2.4.2.4 Limits:

Select to view, remove or edit the high and low threshold voltage limits for the string.

2.4.2.5 -> Flash USB:

Select to export the current VDC string to a .bdf file to a USB flash drive connected to the DLV50 USB port. This file can later be transferred to a PC and opened with Winmeter 5.0 software.

2.4.2.6 -> Print IRDA:

Select to print the current VDC string to a .bdf file to a USB flash drive connected to the DLV50 USB port.

2.4.2.7 Delete String:

Select to delete all VDC data in the current VDC string.

This process cannot be undone!

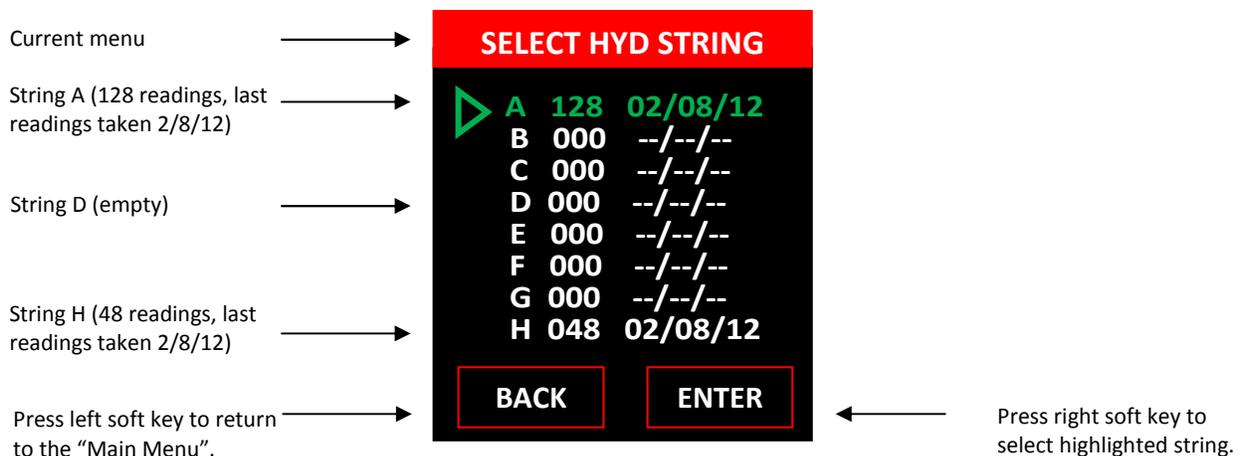
2.5 HYD Mode

To select HYD Mode, from the “Main Menu” use the up/down keys to highlight “HYD Mode” then push the right soft key (below “ENTER”) to select.

Select “HYD MODE” to upload hydrometer data from a DMA35 digital hydrometer, then view, analyze, export to USB flash drive, print via IRDA.

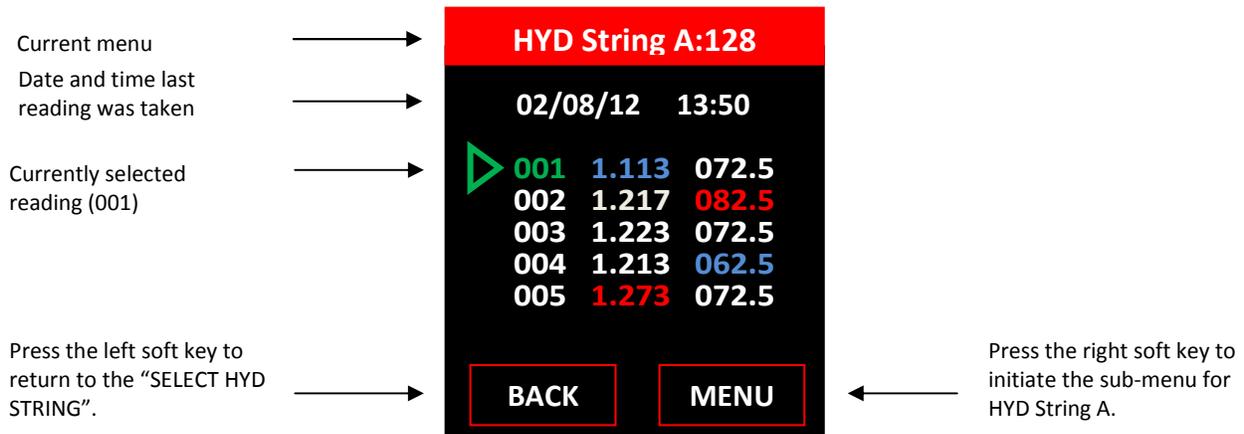
The DLV50 can upload and store up to 8 strings of 256 readings (specific gravity & temperature) stored in strings A through H.

Once HYD Mode is selected the user then selects which string (A through H) to open. Each string is displayed together with the number of contained readings and the date the last reading was taken.



2.5 1 Selecting a Hydrometer String

Use the “UP” & “DOWN” keys to highlight the required string then push the right soft key (below “ENTER”) to select/open the string.

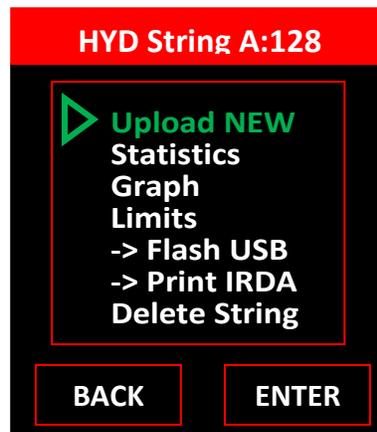


Readings highlighted in blue indicate they are below the low threshold level. Readings highlighted in red show they are above the high threshold level. Threshold levels for both specific gravity are optional and editable.

To scroll through all hydrometer readings in String A, use the “UP” and “DOWN” keys.

2.5.1 HYD Sub-Menu

To enter the VDC sub-menu press the right soft key (below “MENU”).



Selecting VDC Sub-Menu Options:

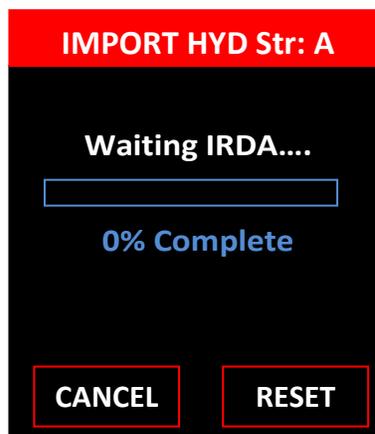
Use the “UP” & “DOWN” keys to highlight the appropriate option then push the right soft key (below “ENTER”) to select that option.

There are 7 options to select from the HYD sub-menu:

- [Upload New](#)
- [Statistics](#)
- [Graph](#)
- [Limits](#)
- [->Flash USB](#)
- [->Print IRDA](#)
- [Delete String](#)

2.5.2.1 Upload New:

Select to upload hydrometer data directly from a DMA35 digital hydrometer (via IRDA) .



Refer to [Uploading Hydrometer Data to the DLV50](#) for additional instructions.

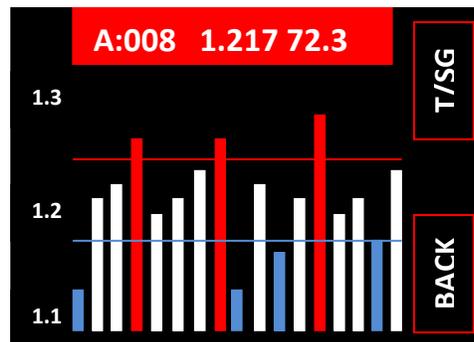
2.5.2.2 Statistics:

Select to view statistics for the current HYD string.



2.5.2.3 Graph:

Select to view graphical analysis of current HYD string.



2.5.2.4 Limits:

Select to view, remove or edit the high and low threshold limits (specific gravity and temperature) for the string.

2.5.2.5 -> Flash USB:

Select to export the current HYD string to a .bdf file to a USB flash drive connected to the DLV50 USB port. This file can later be transferred to a PC and opened with Winmeter 5.0 software.

2.5.2.6 -> Print IRDA:

Select to print the current HYD string to IRDA compatible printer.

2.5.2.7 Delete String:

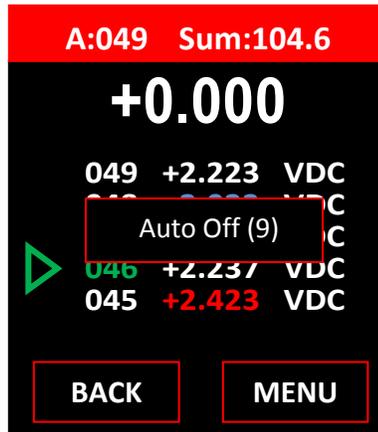
Select to delete all HYD data in the current HYD string.

This process cannot be undone!

3.0 Power Saving Features

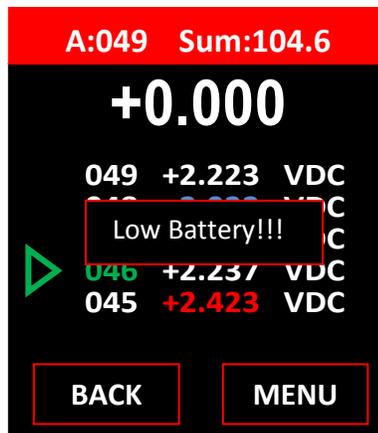
3.1 Auto-Off

After approximately **(3) minutes** of non-operation, the unit will **beep** and display an auto-off warning for **10 seconds**. Pressing **any** button during this time will **cancel** the auto-off feature.



3.2 Low Battery Indication

A low battery is indicated by a warning:



It is recommended that the battery is replaced before the next scheduled use.

3.3 Checking Internal Battery Voltage

To check the battery voltage at any time

- (i) If not in Main Menu, press the **"BACK"** button **repeatedly** to enter the **"Main Menu"**.
- (ii) Press the left soft key **"ABOUT"** to display the ["About Screen"](#).

4.0 Deleting String Data and Editing Test Thresholds

4.1 Option 1: Using Winmeter 5.0 Software

- (i) Connect the DLV50 to Winmeter 5.0 software via USB.

If the Winmeter 5.0 AutoStart software is not enabled, **RUN** the Winmeter 5.0 software to initiate data transfer.

If the “DLV50 USB Interface” does not initiate automatically select “Download Device” -> “Via USB (search for device)”

Once connected, the DLV50 will display “DLV50 <-> PC” and sync contained data and settings with Winmeter 5.0.

- (ii) Once data transfer is complete:

(A) Select any/all strings that contain obsolete data.

The screenshot shows the Voltlogger Plus USB Interface software. It has two tabs: 'DATA' and 'THRESHOLDS'. The 'DATA' tab is active, showing two tables: 'VOLT METER' and 'HYDROMETER'. Both tables have a 'Delete' column with checkboxes. In the 'VOLT METER' table, row A is selected. In the 'HYDROMETER' table, rows A, B, and C are selected. At the bottom, there are buttons for 'Delete Selected', 'Refresh', 'Save', 'Cancel', 'Help', and 'Setup'. A status bar at the bottom indicates 'USB Interface : Connected' and 'Status: Uploading DLV-50 Data Complete'. Red arrows labeled A, B, and C point to the 'Delete' column, the 'Delete Selected' button, and the 'THRESHOLDS' tab respectively.

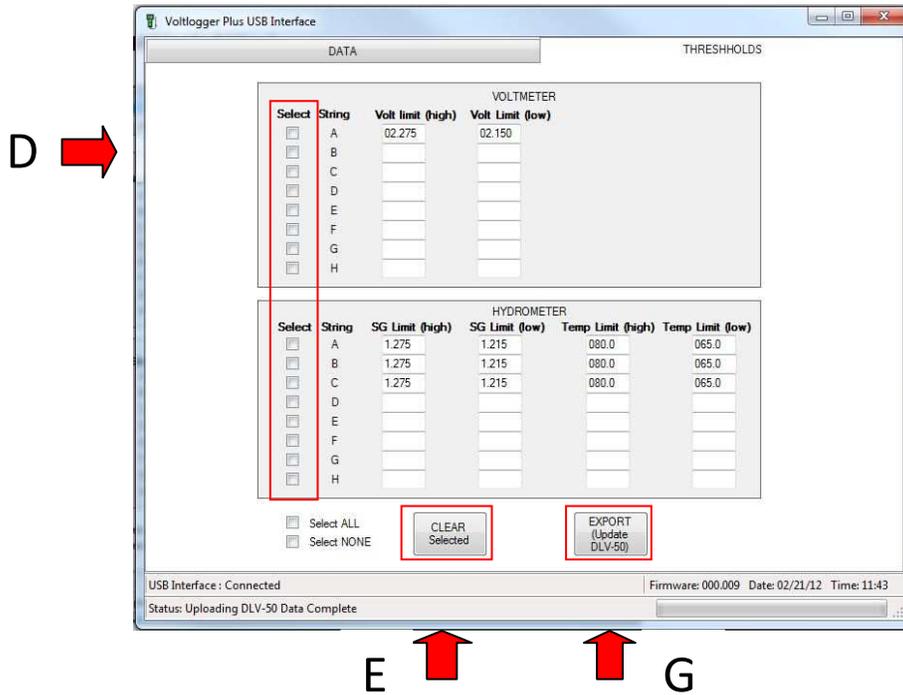
Delete	String	Exported?	Data	Date	Time	MaxV[cell#]	MinV[cell#]	AvgV	SumV
<input checked="" type="checkbox"/>	A	N	48	02/08/12	14:50	6.493 [006]	0.094 [002]	3.487	163.5
<input type="checkbox"/>	B	-	0	-/-/-	-/-	-	-	-	-
<input type="checkbox"/>	C	-	0	-/-/-	-/-	-	-	-	-
<input type="checkbox"/>	D	-	0	-/-/-	-/-	-	-	-	-
<input type="checkbox"/>	E	-	0	-/-/-	-/-	-	-	-	-
<input type="checkbox"/>	F	-	0	-/-/-	-/-	-	-	-	-
<input type="checkbox"/>	G	-	0	-/-/-	-/-	-	-	-	-
<input type="checkbox"/>	H	-	0	-/-/-	-/-	-	-	-	-

Delete	String	Exported?	Data	Date	Time	MaxSG[cell#]	MinSG[cell#]	AvgSG	MaxT[cell#]	MinT[cell#]	AvgT
<input checked="" type="checkbox"/>	A	N	10	02/08/12	14:50	1.000 [001]	0.999 [002]	0.999	60.1 [001]	59.4 [009]	59.5
<input checked="" type="checkbox"/>	B	N	10	01/01/10	12:01	1.000 [001]	0.999 [002]	0.999	60.1 [001]	59.4 [009]	59.5
<input checked="" type="checkbox"/>	C	N	10	01/01/10	12:02	1.000 [001]	0.999 [002]	0.999	60.1 [001]	59.4 [009]	59.5
<input type="checkbox"/>	D	-	0	-/-/-	-/-	-	-	-	-	-	-
<input type="checkbox"/>	E	-	0	-/-/-	-/-	-	-	-	-	-	-
<input type="checkbox"/>	F	-	0	-/-/-	-/-	-	-	-	-	-	-
<input type="checkbox"/>	G	-	0	-/-/-	-/-	-	-	-	-	-	-
<input type="checkbox"/>	H	-	0	-/-/-	-/-	-	-	-	-	-	-

- (B) Click the “Delete” button.

The DLV50 will then delete all selected strings.

- (C) Select the “THRESHOLDS” tab.



- (D) Select ALL strings that you would like to remove limits for.
- (E) Click **“CLEAR Selected”**.
- (F) Edit all threshold limits you would like to change.
- (G) Click **“EXPORT (Update DLV50)”** to send these changes to the attached DLV50.
- (H) Disconnect the USB cable from the DLV50.

The DLV50 USB cable **MUST** be **DISCONNECTED** whenever measuring cell voltages!

4.2 Option 2: Manually

4.2.1 Deleting Individual VDC/HYD Strings

- (i) Turn the DLV50 **ON** & select **“VDC Mode”** or **“HYD Mode”**.

The DLV50 must **NOT** be connected to the PC via USB!

- (ii) Select required VDC or HYD string to delete.
- (iii) Press **“Menu”** to select the VDC sub-menu or HYD sub-menu and select **“Delete String”**
- (iv) Press **“YES”** to delete the VDC or HYD string.

The DLV50 will now delete the selected VDC/HYD string.
This process will take approximately 3 seconds.

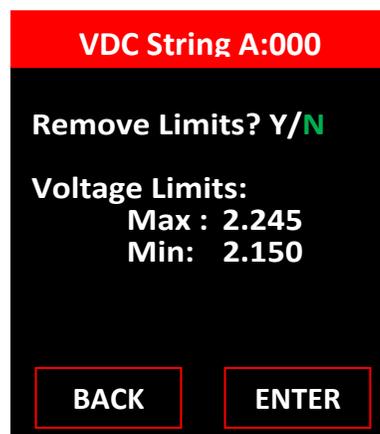
4.2.2 Deleting ALL (Voltmeter and Hydrometer) Strings

- (i) From the [Main Menu](#) select [“Delete ALL”](#).
- (ii) Press **“YES”** to delete **ALL** voltmeter strings and **ALL** hydrometer strings.
This process cannot be undone!

4.2.3 Editing Individual VDC/HYD String Threshold Limits

- (i) Select required VDC/HYD string.
- (ii) Press **“Menu”** to select the VDC/HYD sub-menu and select **“Limits”**.

For example, to edit string A voltage limits:



To **remove** the limits for the selected voltage string:

- Push the **“UP”** key to select **“Remove Limits? Y/N”** to remove limits.
- Push **“ENTER”**.

To **edit** the limits for the selected voltage string:

- With **“Remove Limits? Y/N”**, Push **“ENTER”**.
- Use the **“UP”** and **“DOWN”** keys to edit the **“Max”** Limit then push **“ENTER”** to select.
- Use the **“UP”** and **“DOWN”** keys to edit the **“Min”** Limit then push **“ENTER”** to select.

- (iii) Press **“YES”** to delete the VDC string.

4.2.4 Remove ALL (Voltmeter and Hydrometer) Thresholds Limits

- (iv) From the [Main Menu](#) select [“Reset Limits”](#).
- (v) Press **“YES”** to remove **ALL** voltmeter limits and **ALL** hydrometer limits.

This process cannot be undone!

5.0 Taking DC Cell Voltage Measurements

5.1 Measuring DC Cell Voltages

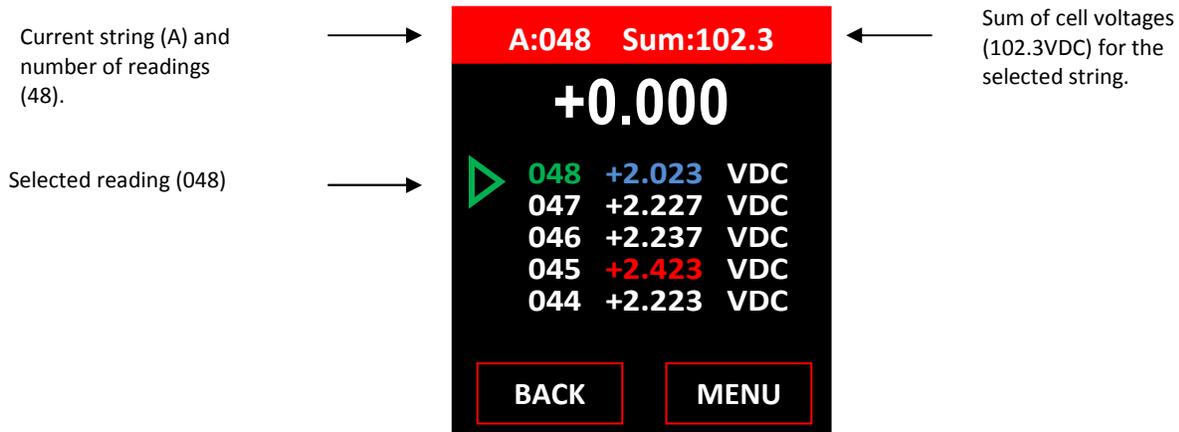
The DLV50 is designed to measure absolute DC cell voltages between 0.1 VDC and 19.999 VDC. Attempts to measure higher DC voltages will result in an **“OVERVOLTAGE!!!”** warning.

ALL DLV50 USB and RS232 cables MUST be DISCONNECTED before measuring voltages!

Cell voltage measurements are taken in a similar fashion to traditional voltmeter.

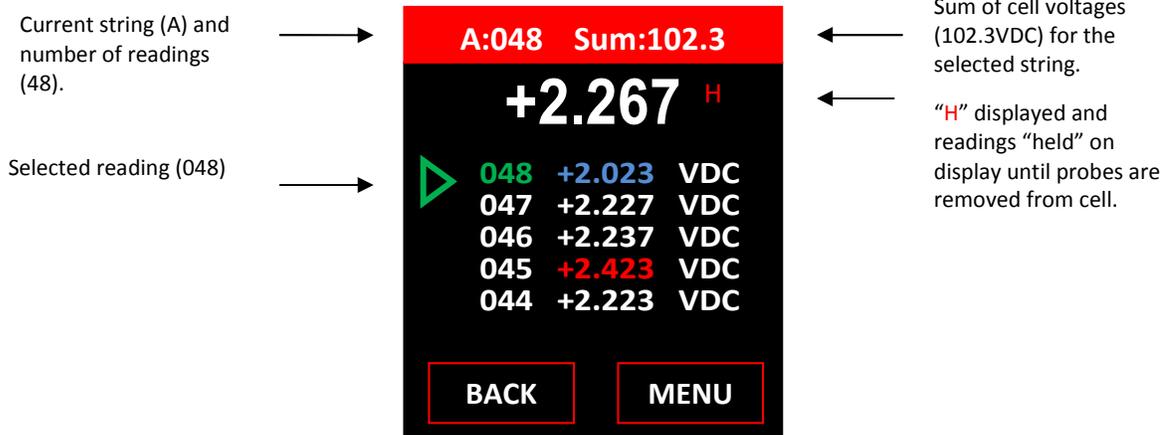
- (i) Turn the DLV50 **ON**.
- (ii) Select **“VDC Mode”**.
- (iii) Select **required string** (A through H)
- (iv) Press **“Menu”** then select **“Add/Delete”**.

NOTE: If the selected string already contains voltage reading, the DLV50 will automatically “point” to the last reading location.



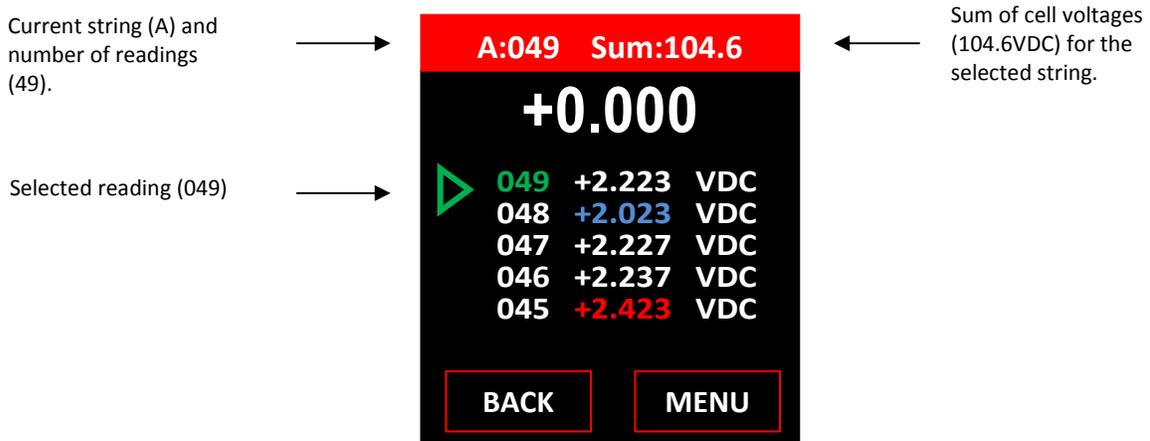
- (v) Connect the voltage probes to the cell terminals.

The DLV50 automatically detects that it is connected to a cell and begins measuring the cell voltage. When the measurement is **stable** (within +/- 0.005 VDC) the DLV50 automatically **beeps** and the reading is **held** on the display until the probes are removed from the cell.



- (vi) Remove the voltage probes from the cell terminals.

The reading is **held** on the display until the probes are **removed**. After approximately (1) second the DLV50 **stores** the reading, **adds** the reading to the sum of string cell voltages and **increments** to the next reading.



- (vii) Repeat steps (iv) and (v) until all cell voltages in the string have been measured.

5.2 Over Voltage Indication

The DLV50 provides both an audio and visual indication if the probes are connected to an excessive input voltage ($V_{in} < -19.999$ VDC or $V_{in} > +19.999$ VDC).

The unit will **beep** continuously and display:



This warning is removed as soon as the probes are disconnected from the high voltage source.

5.3 Recording Over a Previous Measurement

To record over a previous measurement:

- (i) Press the “UP” or “DOWN” buttons to scroll to the required reading location (for example reading 46).



← +2.237 VDC is the current readings stored in location A:046.

- (ii) Connect probes to cell 046 and take the new measurement.



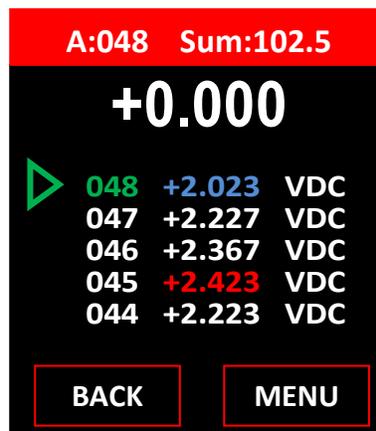
- (iii) Select the appropriate response (“Replace #046”) and press “YES” or “CANCEL” to void last reading.

5.4 Deleting a Previous Measurement

- (i) Press the “UP” or “DOWN” buttons to scroll to the required reading location (for example, reading 047).



- (ii) Press “MENU” and select “Delete # 047”, then press “ENTER” to delete the selected reading.



When a reading is deleted **ALL** readings in memory locations **above** the deleted cells are moved **down** (1) location.

6.0 Uploading Hydrometer Data to the DLV50

During the data transfer process, **ALL** existing data in the selected HYD string of the DLV50 will be **erased** and/or **over-written!**

6.1 Transferring Data from a DMA35 to the DLV50

For the DMA35:

- (i) Turn the DMA35 **ON**.
- (ii) Use the **“EXPORT ALL”** function to initiate the data transfer by pushing the following buttons on the DMA35 in sequence:
“Menu” → “OK” → “Export” → “OK”.
- (iii) Line up the IR windows of the DMA-35 and DLV50.

For the DLV50:

- (iv) From the **“Main Menu”** select **“HYD Mode”**.
- (v) Select the required HYD string (A->H) .
- (vi) Select **“Menu”**.
- (vii) Select **“Upload New”**.

NOTE: Only the **first 256 readings** stored in the DMA35 hydrometer can be uploaded to the DLV50.

NOTE: During the IRDA data transfer, the DMA35 will show the status of the connection and then transfer progress.

NOTE: IRDA data transfer will take 5 to 20 seconds depending on file size.

7.0 Connecting the DLV50 to PC/Winmeter 5.0

- (i) Connect the DLV50 to a PC (via USB cable) with Winmeter 5.0 software installed.

If the Winmeter 5.0 Auto-start software is not enabled, **RUN** the Winmeter 5.0 Software.

If the “Voltlogger Plus Interface” does not initiate automatically, select “Download Device” -> “Via USB (search for device)”.

Once connected, the DLV50 will display “DLV50 <-> PC” and sync contained data, threshold and date & time settings with Winmeter 5.0.

The screenshot shows the Voltlogger Plus USB Interface window. It contains two data tables: VOLT METER and HYDROMETER. The VOLT METER table has columns: Delete, String, Exported?, Data, Date, Time, MaxV[cell#], Minv[cell#], AvgV, and SumV. The HYDROMETER table has columns: Delete, String, Exported?, Data, Date, Time, MaxSG[cell#], MinSG[cell#], AvgSG, MaxT[cell#], MinT[cell#], and AvgT. At the bottom, there are buttons for 'Delete Selected', 'Refresh', 'Save', 'Cancel', 'Help', and 'Setup'. The status bar at the bottom indicates 'USB Interface : Connected' and 'Status: Uploading DLV-50 Data Com...'. Red arrows labeled A through E point to the 'Delete Selected' button, the 'THRESHOLDS' tab, the 'Setup' button, a data row in the VOLT METER table, and the 'Save' button respectively.

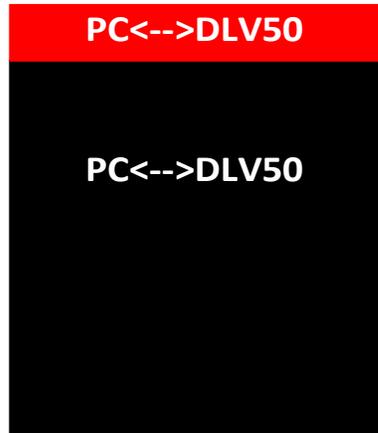
Once data transfer is complete the user can easily:

- (A) Select & delete any/all strings that contain obsolete data.
- (B) Click “**Thresholds**” tab to edit/remove *any* thresholds (voltage, SG & temp.) for *any* string.
- (C) Click “**Setup**” to update the DLV50 firmware or change the Winmeter auto-launch setting.
- (D) Double-click any data row to preview string data.
- (E) Click “**Save**” to begin the report generation process.

NOTE : Please refer to the Winmeter 5.0 Help file for additional instruction for battery test report generation.

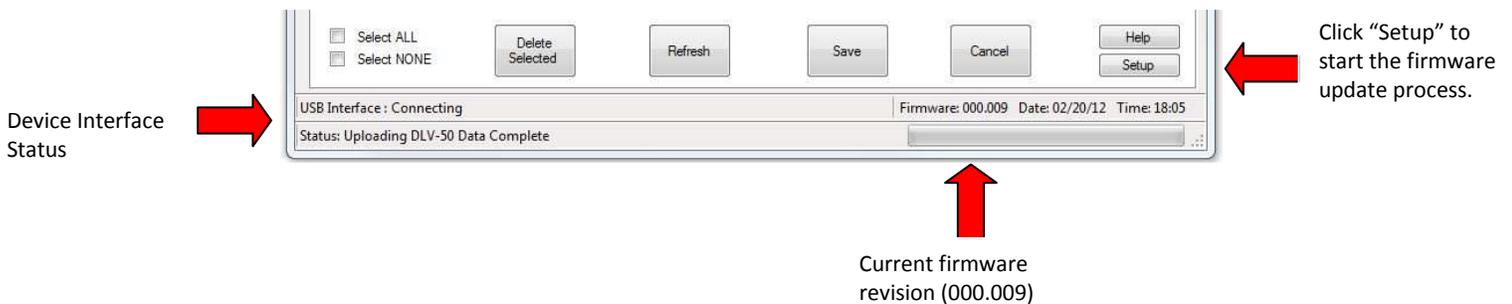
8.0 Upgrading DLV50 Firmware

- (i) Connect the DLV50 to Winmeter 5.0 software via the supplied USB cable. The DLV50 will detect the USB connection and enter “PC<-->DLV50” mode.



If the Winmeter 5.0 AutoStart software is NOT enabled, **RUN** the Winmeter 5.0 software to initiate data transfer.

If the data transfer does **not** initiate automatically, ensure the DLV50 is turned ON and connected correctly then select “**Download Device**” -> “**Via USB (search for device)**” from the Winmeter 5.0 main window.

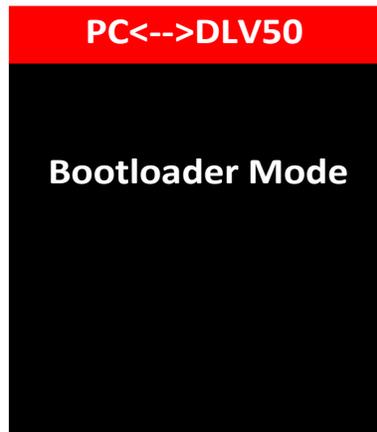


Once connected, the DLV50 connection status and current firmware revision will display in the footer of the appropriate Interface window.

- (ii) Click the **“Setup”** button to open the **“Update DLV50 Firmware”** window.



- (iii) Click **“Update Firmware”** to place DLV50 into Bootloader Mode and start the DLV50 Bootloader application.



DLV50 in Bootloader Mode



DLV50 Bootloader Software

- (iv) Click **“Open Hex File”** and select the new DLV50 firmware file (*.hex).

Ensure the **correct** firmware for the **correct** device is selected!

- (v) Click **“Program”** to begin the firmware upgrade.

Do **NOT** disconnect the USB cable while the Device is being programmed!

- (vii) Once the DLV50 firmware has been updated, the Device Bootloader software will close and the DLV50 will restart.

If the DLV50 does not re-connect automatically with Winmeter 5.0, select **“Download Device”** -> **“Via USB (search for device)”**.