

Operator's Manual DLV-Pro Data Logging Voltmeter *Plus*



Rev: 07 Date: 9/29/2014 DLV-Pro Firmware: Rev 003.011 and above Winmeter 5.1 Software: Rev 1.0.0.010 and above

Table of Contents:

1.0 Overview

2.0 Menu System

- 2.1 Main Menu
- 2.2 About Screen
- 2.3 Main Menu Options
- 2.4 <u>"VDC 20 x 48" & "VDC 8 x 256" Modes</u>
 - 2.4.1 <u>Selecting a Voltage String</u>
 - 2.4.2 VDC Mode Sub-Menu
 - 2.4.2.1 Add/Delete
 - 2.4.2.2 Statistics
 - 2.4.2.3 Graph
 - 2.4.2.4 Limits
 - 2.4.2.5 ->Flash USB
 - 2.4.2.6 ->Print IRDA
 - 2.4.2.7 Delete String
- 2.5 <u>"HYD 8 x 256" Mode</u>
 - 2.5.1 Selecting a Hydrometer String
 - 2.5.2 HYD Mode Sub-Menu
 - 2.5.2.1 Upload New
 - 2.5.2.2 Statistics
 - 2.5.2.3 Graph
 - 2.5.2.4 Limits
 - 2.5.2.5 ->Flash USB
 - 2.5.2.6 ->Print IRDA
 - 2.5.2.7 Delete String
 - 2.6 <u>"Discharge Test" Mode</u>
 - 2.6.1 Menu/Setup
 - 2.6.2 Optional Discharge Parameters
 - 2.6.2.1 Load IDC
 - 2.6.2.2 Initial & Final SG/T
 - 2.6.3 Discharge Cell Voltage Readings (Strings B through K)

3.0 **Power Features**

- 3.1 <u>Auto-Off</u>
- 3.2 Low Battery Indication
- 3.3 Checking Internal Battery Voltage
- 3.4 <u>Rechargeable Features</u>

4.0 Deleting String Data and Editing Test Thresholds

- 4.1 Option 1: Using Winmeter 5.1 Software
- 4.2 Option 2: Manually
 - 4.2.1 Deleting Individual VDC/HYD Strings
 - 4.2.2 Deleting ALL (Voltmeter and Hydrometer) Strings
 - 4.2.3 Editing Individual VDC/HYD String Threshold Limits
 - 4.2.4 <u>Remove ALL (Voltmeter and Hydrometer) Thresholds Limits</u>

5.0 <u>Taking DC Cell Voltage Measurements (ALL Modes)</u>

- 5.1 Measuring DC Cell Voltages
- 5.2 Over Voltage Indication
- 5.3 <u>Recording Over a Previous Measurement</u>
- 5.4 **Deleting a Previous Measurement**
- 6.0 Uploading Hydrometer Data to the DLV-Pro
 - 6.1 Transferring Data from a DMA35 Digital Hydrometer to the DLV-Pro

7.0 Discharge Test Procedure

- 7.1 <u>Step1: Select DLV-Pro "Discharge Test" Mode & Clear Existing Test Data</u> 7.1.1 Option 1: Using Winmeter 5.1 Software
 - 7.1.2 Option 2: Manually
- 7.2 Step 2: Measure String Float Cell Voltages
- 7.3 <u>Step 3: Upload Float SG/T Readings</u>
- 7.4 <u>Step 4: Starting the Discharge Test Timer & Taking Discharge Readings</u>
- 7.5 <u>Step 5: Upload Final SG/T Readings</u>
- 7.6 <u>Step 6: Upload Discharge Test Data to Winmeter 5.1</u>
- 7.7 Step 7: Generate Cell Discharge Report(s)
- 7.8 Step 8: Save Cell Discharge Report(s)
- 8.0 <u>Connecting the DLV-Pro to PC/Winmeter 5.1</u>
- 9.0 Upgrading DLV-Pro Firmware

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

1.0 Overview

The DLV-Pro data logging voltmeters have been designed specifically for the battery test industry.

The DLV-Pro is capable of operating in (4) distinct measuring modes:

- (i) VDC 20 x 48: The DLV-Pro can measure and analyze up to 960 readings of cell voltages between 0.1 VDC and 19.999 VDC (inclusive). These readings are stored in 20 separate data strings of 48 readings, denoted A through T. The date and time of the last reading in each string is also recorded.
- (ii) VDC 8 x 256: The DLV-Pro can measure and analyze 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.
- (iii) HYD 8 x 256: The DLV-Pro can receive and analyze 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.
- (iv) **Discharge Test**: The DLV-Pro can measure and store up to 256 float and up to 10 sets of individually time-stamped readings each of the cells voltage during a discharge test.

Readings in **String "A"** are reserved for the initial (**float**) voltage of the cell and are **NOT** time stamped.

Readings in **Strings "B" through "K"** are reserved for cell voltages **during** the **discharge** (or charge) test with **each** reading being **time stamped** to the nearest second from the **start** of the discharge test. The date and time of the last reading is also recorded.

The user may also select to:

- Record up to 256 measurements of **load current** by measuring, scaling and timestamping the mV output of a shunt or clamp-on meter.

- Record the float & final readings of specific gravity & temperature.

All **DLV-Pro** modes operate **independently**. Erasing the memory in one mode does **NOT** affect readings in the remaining (3) modes.

All stored readings can be downloaded via Winmeter 5.1 software to generate detailed test reports including statistical and graphical analysis and then stored into a custom database. This software communicates with the DLV-Pro via USB and allows the User to set the time/date, change modes, delete data string(s) and set thresholds and settings. The readings can also be transferred to a USB flash drive in .BDF (Float data) format or .DDF (discharge data) format.

2.0 Menu System

2.1 Main Menu

When turned ON, the DLV-Pro displays date, time and firmware revision for 3 seconds then displays the **"Main Menu".**



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

2.2 About Screen

Press the Left soft key (below "ABOUT") to display the "About DLV-Pro" 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:

<u>VDC 20 x 48:</u>	Select to view, analyze, edit or measure DC cell voltages. The DLV-Pro stores up to 20 strings of 48 readings stored in strings A through T.
<u>VDC 8 x 256:</u>	Select to view, analyze, edit or measure DC cell voltages. The DLV-Pro stores up to 8 strings of 256 readings stored in strings A through H.
<u>HYD 8 x 256:</u>	Select to view, analyze or upload additional strings of hydrometer reading from a DMA35 hydrometer. The DLV-Pro stores up to 8 strings of 256 readings stored in strings A through H. Both specific gravity and temperature are stored for each cell.
<u>Discharge Test:</u>	Select to perform a discharge test. Measure and store up to 256 float and up to 10 sets of individually time-stamped readings each of the cells voltage during a discharge test. The User may also select to record load current during the discharge and/or record the float (before discharge) & final (after discharge) readings of specific gravity & temperature
Export ALL:	Select to Export ALL data to USB Flash drive.
Delete ALL:	Select to Delete ALL data in all strings.

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 5.1 software.

Reset Limits: Select to Delete **ALL** high and low threshold limits for voltage and hydrometer readings. The load current calibration factor is also reset to 100mV => 100IDC

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 5.1 software.

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

The date and time setting is automatically synced with the PC date and time whenever the DLV-Pro is connected with the Winmeter 5.1 software

2.4 VDC Mode ("20 x 48" & "8x256")

To select VDC Mode, from the **"Main Menu"** use the Up/Down keys to highlight **"VDC 20 x 48"** or **"VDC 8 x 256" mode** then push the Right soft key (below **"ENTER")** to select.

Select either VDC mode to View, Analyze, Export to USB flash drive, Print via IRDA, Edit or Add to stored DC cell float voltages.

In "VDC 20 x 48" mode, the DLV-Pro stores up to 20 strings of 48 readings stored in strings A through T.

In **"VDC 8 x 256"** mode, the DLV-Pro stores up to 8 strings of 256 readings stored in strings A through H.

Once the VDC mode is selected the User then selects which string (A -> T or A -> H) to open. Each string is displayed together with the number of contained readings and the date the last reading was taken.

Current menu	>	SELECT VI	DC STRING
String A (48 readings, last readings taken 2/8/12)		A 048 B 000	02/08/12 //
String D (empty)		C 000 D 000 E 000 F 000	// // //
String H (128 readings, last readings taken 2/8/12)	>	G 000 H 128	// 02/08/12
Press Left soft key to retur to the "Main Menu".	n>	BACK	ENTER

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.

VDC String A:048	
Cell Voltage: Sum: 102.3 Avg: 2.025 Max: 2.473 [023] Min: 1.964 [018]	
ВАСК	

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 DLV-Pro USB port. This file can later be transferred to a PC and opened with Winmeter 5.1 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 DLV-Pro 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 8 x 256" Mode

To select HYD Mode, from the **"Main Menu"** use the Up/Down keys to highlight **"HYD 8 x 256"** then push the Right soft key (below **"ENTER")** to select.

Select **"HYD 8 x 256"** to upload hydrometer data from a DMA35 digital hydrometer, then View, Analyze, Export to USB flash drive, Print via IRDA.

The DLV-Pro 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 <u>Uploading Hydrometer Data to the DLV-Pro</u> for additional instructions.

2.5.2.2 Statistics:

Select to view statistics for the current HYD string.

HYD String A:128	
SG: Avg: 1.236 Max: 1.273 [005] Min: 1.109 [018] Temp: Avg: 72.7 Max: 82.5 [002] Min: 61.6 [018]	
ВАСК	

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 DLV-Pro USB port. This file can later to transferred to a PC and opened with Winmeter 5.1 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!

2.6 "Discharge Test" Mode

To select **"Discharge Test"** Mode, from the **"Main Menu"** use the Up/Down keys to highlight **"Discharge Test"** then push the Right soft key (below **"ENTER")** to select.

Select **"Discharge Test"** to measure and store up to 256 float and up to 10 sets of individually timestamped readings each of the cells voltage during a discharge test.

The DLV-Pro can upload and store up to 10 strings of 256 readings (specific gravity & temperature) stored in strings B through K.

Once "Discharge Test" mode is selected, the user may also select to:

- Record up to 256 measurements of **load current** by measuring, scaling and time-stamping the mV output of a shunt or clamp-on meter.
- Record the float & final readings of specific gravity & temperature.

2.6.1 Menu/Setup

Select to start "Discharge Test" or configure settings for the "Discharge Test".



Note: User must record float readings before being able to start Discharge Test!!!

2.6.2 Optional Discharge Parameters

To enable optional parameters for the "Discharge Test", the user can toggle off "Load IDC", "Initial SG", "Final SG" from the "Menu/Setup" > "Edit Setup".



2.6.2.1 Load IDC

Enable this option to record measurements of load current with the use of a shunt or clamp-on meter.



2.6.2.2 Initial & Final SG/T

Enable these options to include Initial and Final SG and Temperature readings in the Discharge Test.

Discharge 0:00:	00		
Select Defaults? Include:	Ν		
- Load IDC	N		Select "Y" to enable the
- Initial SG	Y	•	"Initial SG" & "Final SG"
- Final SG	Y	•	option.
IDC Calibration:			
100 mV = 100.0	0 IDC		
CANCEL	TER	←	confirm each selection.

2.6.3 Discharge Cell Voltage Readings (Strings B through K)

The User can record measurements of up to 256 readings per string from B through K. The number of measurements that can be recorded per string from B through K is defined by how many float readings are measured in String A.

Note: User must record float readings and start Discharge Test first before measuring discharge voltages on String B through K.

3.0 Power 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 fully recharged 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 <u>"About Screen"</u>.

3.4 Rechargeable Features

To charge your unit, please use the provided USB wall charging jack with the provided AC USB Wall Adapter. It will offer the fastest charging time for the unit. As an alternative, the mini USB cable via PC can be used to charge the unit at a much slower charging rate.

Accessory/Cable:	Estimated Charging Time
USB charging jack cable with AC USB Wall Adapter	~4 to 5 hours
Mini USB cable connected to PC via USB	~10 to 12 hours

Note: PLEASE DO NOT CONNECT USB CHARGING JACK CABLE DIRECTLY TO PC TO CHARGE UNIT!!!

While the unit is charging, there will be an LED on the bottom of the unit above the charging port that will be orange while charging and green when it is fully charged.

4.0 Deleting String Data and Editing Test Thresholds

4.1 Option 1: Using Winmeter 5.1 Software

(i) Connect the DLV-Pro to Winmeter 5.1 software via USB.

If the Winmeter Autostart software is not enabled, **RUN** the Winmeter 5.1 software to initiate data transfer.

If the "DLV50 USB Interface" does not initiate automatically select "Download Device" -> "DLV-Pro (search for device)"

Once connected, the DLV-Pro will display **"DLV-Pro <-> PC"** and sync contained data and settings with Winmeter 5.1.

- (ii) Once data transfer is complete:
 - (A) Select any/all strings that contain obsolete data.

	VDC & SG FLOAT (8 by 256)		1	VDC	FLOAT (20 by 4	8)	3	DISCHARGE T	EST		
						VOLT	METER				
Delete	String	Exported?	Data	Date	Time	MaxV[cell#]	Minv(cell#)	AvgV	SumV		
		N	(-)	02/28/10	02:22	5.099 [001]	5.099 [001]	5 099	5.0		
13	B	-	0				1.0	-	-		
	С		0	-1-1	***			+)	+		
13	D	5	0	-/-/		1		5	-		
13	E	-	0	//		-					
	F	-	0				7.62	-			
	G		0	//	-		1.00	5			
13	н	-	0					*			
										10	
a						HYDE	OMETER				
Delete	String	Exported?	Doto	Date	Time	MoxSG[cell#]	MinSG[cell#]	AvgSG	MaxT[cell#]	MinT[cell#]	1
	A			02/01/13		1.000 [001]	0.666 [005]	0.999	60.1 (001)	59.4 [009]	
	В	N	10	07/01/13	11.58	1.000 [001]	0.999 [002]	0.999	60.1 [001]	59.4 [009]	
10	С	-	0	/			-				
	D	- Ca	0	//	-	-	9	12		242	
	E	10	0	!!		-	1	17	-	0.00	
13	F		0	-sofeenfree							
11	G	14	0			-	-	14		-	
	н	14 - C	0	//							
	-										
E s	ik ct ALL	Dele	əte	E	int V & SG	Re	Sync				

- (B) Click the "Delete" button. The DLV-Pro will then delete all selected strings.
- (C) Click the "Edit V & SG Limits" button to View/Edit the current 8 x 256 voltage & SG thresholds.

VDC & SG	FLOAT (8 by 256)	VDC FLOAT	20 by 48)		DISCHARGE TEST	-
	View/Edit 8 by 256 V	oltage & SG Threshholds	And the second		23	2
Delete String A D C C D C C D E F G H	Select String A B C C D E F G	Valt limit (high) V	VOLTMETER olt Limit (low)			
Delete String B C C D E F G H	Select String A B C D E F G	SG Limit (high) S	HYDROMETER G Limit (kw)	Fomp Limit (high)	Tomp Limit (low)	59 59
Select ALL Select NON	H Select ALL Select NO	CLEAR Select	id (Up	EXPORT date DLV50)	Cancel	Не
USB Interface: Device 0	Connected				rmware: 002.001 Date	: 07/01/13 Tin
Status: Uploading DLV	50 Data Complete					

- (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 DLV-Pro)" to send these changes to the attached DLV-Pro.

(H) Disconnect the USB cable from the DLV-Pro.

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 DLV-Pro **ON** & select "**VDC Mode**" or "**HYD Mode**".

The DLV-Pro 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 DLV-Pro 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 DLV-Pro 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 DLV-Pro 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 DLV-Pro **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.

Current string (A) and	\longrightarrow	A:048 Su	m:102.3	←	Sum of cell voltages (102.3VDC) for the
(48).		+0.0	00		selected string.
Selected reading (048)		048 +2.0 047 +2.2 046 +2.2 045 +2.2 045 +2.2	D23 VDC 227 VDC 237 VDC 237 VDC 223 VDC 223 VDC		
		ВАСК	MENU		

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

The DLV-Pro 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 DLV-Pro 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 DLV-Pro **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 DLV-Pro provides both an audio and visual indication if the probes are connected to an excessive input voltage (Vin < -19.999 VDC or Vin > +19.999 VDC).

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

A:049	Sui	m:1 (04.6
OVER	VOL	TAC	GE!!!
049 048 047 046 045	+2.2 +2.0 +2.2 +2.2 +2.4	23 23 27 37 23	VDC VDC VDC VDC VDC
BACK		N	IENU

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 (Ex: reading 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 (Ex: reading 047).

A:049	Sur	n:104	4.7
+	0.0	00	
049 048 047 046 045	+2.2 +2.0 +2.2 +2.3 +2.4	23 \ 23 \ 27 \ 67 \ 23 \	/DC /DC /DC /DC /DC
BACK		ME	NU

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

A:048 Su	m:102.5
+0.0	00
048 +2.0 047 +2.2 046 +2.3 045 +2.4 044 +2.2	023 VDC 027 VDC 367 VDC 423 VDC 223 VDC
ВАСК	MENU

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

During the data transfer process, **ALL** existing data in the selected HYD string of the DLV-Pro will be **ERASED** and/or **OVERWRITTEN**!

6.1 Transferring Data from a DMA35 to the DLV-Pro

For the DMA35:

- (i) Turn the DMA35 **ON.**
- 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 DLV-Pro.

For the DLV-Pro:

- (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 DLV-Pro.

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

7.0 Discharge Test Procedure

7.1 Step 1: Select "Discharge Test" Mode, Clear Existing Test Data & Select Discharge Test Options/Thresholds

7.1.1 Option 1: Using Winmeter 5.1 Software (Recommended)

(iii) Connect the DLV-Pro to PC via USB

If the Winmeter 5.1 Autostart software is not enabled, **RUN** the Winmeter 5.1 software to transfer/sync all data & settings.

Once connected, the DLV-Pro will display "DLV-Pro <-> PC"

If the "Voltlogger Plus USB Interface" does not initiate automatically select "Download Device" -> "DLV-Pro (search for device)".

(iv) "Click" on the "DISCHARGE TEST" tab.



(v) "Click" the "Delete Test" button.

The DLV-Pro will then **delete ALL "Discharge Test"** data.

This **includes** deleting load current & initial/final hydrometer data (even if these options are **NOT** currently selected)

Test thresholds (voltage, load current, SG & temperature) & the load current calibration factor are **NOT** affected

(vi) "Program" the connected DLV-Pro with the required test parameters.

All thresholds are optional. To void any test threshold simply delete the contents of the associated text box

Cell Voltage:

- Enter/Edit "Cell Limit Hi (Float & Discharge)"
- Enter/Edit "Cell Limit Lo (Float)"
- Enter/Edit "Cell Limit Lo (Discharge)"

Load Current:

- Select/Unselect "Include Load Current Data
- Enter/Edit "Load Current Calibration Factor"

The load current calibration factor cannot be voided.

- Enter/Edit "IDC Limit (hi)"
- Enter/Edit "IDC Limit (lo)"

Initial SG & Temp.:

- Select/Unselect "Include Initial SG & Temp Data
- Enter/Edit "SG Limit (hi)"
- Enter/Edit "SG Limit (lo)"

- Enter/Edit "Temp. Limit (hi)"
- Enter/Edit "Temp. Limit (lo)"

Final SG & Temp.:

- Select/Unselect "Include Final SG & Temp Data
- Enter/Edit "SG Limit (hi)"
- Enter/Edit "SG Limit (lo)"
- Enter/Edit "Temp. Limit (hi)"
- Enter/Edit "Temp. Limit (lo)"

Click **"EXPORT Test Params"** to send load current calibration factor and **ALL** limits & settings to the attached DLV-Pro



(vii) Disconnect the USB cable from the DLV-Pro & select "Discharge Test" to confirm all options programmed successfully.



7.1.2 Option 2: Manually

(i) Turn the DLV-Pro **ON**.

The DLV-Pro must **NOT** be connected to the PC via USB!

(ii) Select "Discharge Test" mode:





String A is reserved for **float** voltages – cell voltage(s) BEFORE a load is attached to the battery.

Strings B through K are reserved for **discharge test** cell voltages. Cell voltages **AFTER** a load are attached to the battery.

As shown, String A, B & C all contains **10** readings and hence there is **existing** Discharge Test data and the DLV-Pro is not ready to start a **new** discharge test. See below for instruction on deleting ALL existing discharge test data.

- (iii) To manually **DELETE ALL** existing discharge test data:
- A. Select "Menu/Setup" option from the "Discharge Test" menu.



B. Press the Right soft key / "ENTER" to select "Delete Test".

Delete D	C Test	
Delete DC	Test?	
		Dross the Dight soft key (
CANCEL	YES	 "ENTER" to select "Delete Test".

C. Press the right soft-key / "YES" to confirm "Delete Test".

The DLV-Pro will now delete:

- ALL (11) voltage strings (Strings A -> K)
- ALL load current data (even if this option is not currently selected)
- ALL float hydrometer data (even if this option is not currently selected)
- ALL final hydrometer data (even if this option is not currently selected)

Test thresholds (voltage, load current, SG & temperature) & the load current calibration factor are **NOT** affected

- (iv) To manually edit discharge set up:
 - A. Select "Menu/Setup" option from the "Discharge Test" menu.



B. Press the Right soft key / "ENTER" to select "Edit Setup".

Discharge 0:0	0:00
Select Defaults? Include:	Ν
- Load IDC	Ν
- Initial SG	Ν
- Final SG	Ν
IDC Calibration:	
100 mV = 10	0.0 ldc
CANCEL	INTER

- C. Use the **"UP/DOWN"** keys to edit each option then press **"ENTER"** to select.
- D. Select "Discharge Test" to confirm all options programmed successfully.



(v) To manually edit discharge test thresholds:

A. Select the data string associated with the threshold to be edited:

- For float voltage thresholds select "A 000 Float VDC"
- For discharge voltage thresholds select any voltage string from B through K
- For load current thresholds select "* 000 Load IDC"
- For load current thresholds select "* 000 Float SG/T"
- For load current thresholds select "* 000 Final SG/T"
- B. Press the Right soft key "MENU".

For example, when changing change float voltage thresholds the DLV-Pro will display:

A:000 Sum: 000.0	
Add/Delete Statistics Graph Limits Delete String	
BACK ENTER	Press the Right soft "ENTER" to select "Limits".

C. Press the Right soft key / "ENTER" to select "Limits".

-	Press the

D. Use the **"UP/DOWN"** keys to edit each option then press **"ENTER"** to select.

7.2 Step 2: Measure String Float Cell Voltages

(i) Ensure the DLV-Pro USB cable is **DISCONNECTED!**

The DLV-Pro USB cable **MUST** be **DISCONNECTED** whenever measuring voltages!

- (ii) Turn the DLV-Pro **ON.**
- (iii) Select "Discharge Test" mode.
- (iv) Select string "A 000 Float VDC".



If any previous discharge test data had been deleted then the DLV-Pro display should match that shown above. If not, please erase ALL previous data (see Step 1

(v) Press the Right soft key / "ENTER" to select "Menu".

Add/Delete Statistics	Add/Delete Statistics Graph Limits		
Statistics	Statistics Graph Limits	Add/Delete	
	Limits	Statistics Graph	

Connect voltage measurement probes to DLV-Pro and measure float cell voltages ensuring that the cell number of the **next reading** matches with the cell number counter in the bottom left hand corner of the display.



For example, after taking 10 cell float voltage readings of average ~ 2.25 the DLV-Pro display should match the above.

Note: The DLV-Pro may be turned **OFF** and **ON** while cell voltage readings are being taken. When turned **ON** and the previous mode selected, the DLV-Pro will record readings in the next empty location.

7.3 Step 3: Add Initial Hydrometer Readings (Optional)

From the discharge test menu select data string "* 000 Float SG/T"



The DLV-Pro now waits for valid data from a DMA35 digital hydrometer

Import Float HYD	
Waiting IRDA	
BACK ENTER	Press the Right soft key /

Refer to section <u>6.0 Uploading Hydrometer Data to the DLV-Pro</u> for instructions to initiate and complete DMA35 hydrometer data transfer.

7.4 Step 4: Start the Discharge Test, Take Up to (10) Sets of Time-Stamped Cell Voltage & Load Current (Optional)

(i) Ensure the DLV-Pro USB cable is **DISCONNECTED!**

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

- (ii) Turn the DLV-Pro **ON.**
- (iii) Select "Discharge Test" mode.
- (iv) Select "Menu/Setup".
- (v) Connect the load bank to the battery string and select "Start Test" and press "ENTER".



For example, if (10) cell float voltage readings have previously been recorded, the DLV-Pro display should match the above ~ 8 seconds after starting the discharge test.

The DLV-Pro may be turned **OFF** and **ON** after the Discharge Test has been started. It will also automatically turn **OFF** after ~3 minutes of inactivity. While **OFF**, the DLV50 will **continue to measure the time elapsed** since the discharge test was started.

If the batteries require changing during a discharge test be sure to **set the date and time correctly**. The DLV-Pro has a small battery backup system to keep the internal clock powered for several minutes during a battery change. E. Wait for the appropriate time interval and take the first set of cell discharge voltage readings.

Note:	
(i)	Location 1, 2, 3 etc for each string (A through K) MUST be used for the same cell.
(ii)	String A readings are reserved for the float voltage of each cell.
(iii)	Strings B through K are reserved for time cell discharge voltage readings. Providing each cell with a maximum of (10) discharge data points (plus the float voltage data point).
(iv)	Each cell discharge voltage reading is time stamped with the elapsed time from the start of the discharge test.
(v)	The User dictates the approximate time interval between each
	set (string) of cell readings.
For best re duration b (35) minut	esults, the User should divide the required battery discharge test y the number of discharge data points required (max 10). So a es discharge test requiring (10) discharge data points for each cell e the User starting each set of readings (measuring Cell 1
voltage) e v	(15) minutes after the discharge test was started
NOTE: Son	ne Users may prefer to take discharge readings more often during
the end of	a discharge test

Connect voltage measurement probes to DLV-Pro and measure the discharge cell voltages ensuring that the cell number of **next** reading matches with the cell number counter in the bottom left hand corner of the display.



For example, after taking the first (10) cell discharge voltage readings of average \sim 2.25, the DLV50 display should match the above.

The DLV-Pro may be turned **OFF** and **ON** after the Discharge Test has been started. The DLV-Pro will continue to measure the time elapsed even when **OFF**. When turned **ON**, the DLV-Pro will automatically start in the previous mode and point to the next reading location.

When the number of readings in String B matches the number of float readings in String A (the User has completed the first set of cell discharge readings) the DLV-Pro automatically increments to String C.

Information!	
Last discharge Reading recorded: Start next string	
ОК	

The User can now start recording the **second set** of discharge cell readings in string C. This process is repeated until the discharge test is completed or all the available Strings (B through K) have been used.

7.5 Step 5: Add Final Hydrometer Readings (Optional)

From the Discharge Test menu select data string "* 000 Final SG/T"



Float HYD 000		
Upload NEW		
Statistics		
Graph		
Limits		
→ Flash USB		
→ Print IRDA		
Delete String		
BACK ENTER		

The DLV-Pro now waits for valid data from a DMA35 digital hydrometer:

Import F	loat HYD	
Waiting	IRDA	
		Press the Right soft key /
BACK	ENTER	 "ENTER" to select "Upload NEW".

Refer to section <u>6.0 Uploading Hydrometer Data to the DLV-Pro</u> for instructions to initiate and complete DMA35 hydrometer data transfer.

7.6 Step 6: Upload Discharge Test Data to Winmeter 5.1

(i) Connect the DLV-Pro to a Winmeter 5.1 software via USB

If the Winmeter 5.1 Autostart software is not enabled, **RUN** the Winmeter 5.1 Software If the "Voltlogger Plus USB Interface" does not initiate automatically select **"Download Device" -> "DLV50 (search for device)"**

	Voltlogger Plus USB Interface		- 0 1
	VDC & SG FLOAT (8 by 256)	VDC FLOAT (20)	by 48) DISCHARGE TEST
Double Click row to	DISCHARGE INFORMATION Test Started: 06/26/13 at 15.3 Duration of Test: 10:53-16 # Cells: 1	2	OPTIONAL DISCHARGE INFORMATION Include Load Current Data Elapsed Time # Data
	VOLTAGE DATA		
preview cell	String Elapsed Time	# Cells Sum (VDC)	Calibration Factor: 100mV = 0100.0 Ange (DC)
discharge data	P 10.47.91 to 10.47.91	1 51	IDC Limit (hi) IDC Limit (Lo):
	0 10.59.18 to 10.59.18	1 51	
	D In		V Include Initial SG & Temp. Data
	E to		Linkson com pour the
	F to		Intel scal i # Cells Sca(Avg) (Avg)
	G to		THE SUIT
	H to		SG Limit (hi): T Limit (hi):
	1 to	·	SG Limit (lo): T Limit (lo):
	J to	·	
	K to		V Indude Final SG & Temp. Data
	Cell Limit Hi (Float & Discharge). Cell Limit Lo (Float):		String # Calls Av. 3G Av. Temp Frant SC/Te
	Cell Limit Lo (Discharge): Bettery Discharge Limit: (#	cells * cell discharge lower limit)	SG Limit (h) T Limit (h) SG Limit (h) T Limit (h) Click "Save" to
	Delete Test Re-Sync Dt./50	EXPORT Test Params	Seve Degin the report generation process
	USB Interface : Connected		Firmware: 002:001 Date: 06/27/33 Time: 1400
	Status: Holoading DIV50 Data Complete		
	and the standing and a complete		

(ii) Click **"Save"** to begin the discharge report generation process.

7.7 Step 7: Generate Cell Discharge Report(s)

Select/enter "End of Test" time & Enter/Edit cell voltage limits

Database information	Database	informatio	n :			End of Test	t (minutes)			SG/TLand	hii			
	Custome	e				O DLVM	"Stop heat"	Imediants	0	[] (resta	de Fibel Ro	adings [Include Fi	el Reedings
remains blank until report	String					C Last D	LV50 meesu	rement	01:01:00		1 1301	1.100	SG Linit 1	100 1 100
s saved to database)	Filename	n -				O User k	put (time in	minutes)	62	T Linit	080.0	060.0	T Limit D	5.0 050.0
	Report In	formation				Voltage Lin	its			Select Los	Select Load Current Date			
ptional report	If of Cell Test Dat Start Tin	e 6/12 e 12.40	/2013 🗊≁ 00 PM 🔯			Cell Voltag Float & I	ge Threshold Discharge (H	59: 40:	245	 None 350 Time 	User Inp Stamped Da	ut - Enter A	wg Discharg	1DC
	Title: Technici	an			-	Discharg	ischarge (Lo) 1.5			Index	Time	lde	*	Max: 380.0
	Battery	lype:				Battery/St	ring Voltage	Thresholds	6	002	00.05.00	310.0	IDC Lim	Mn: 280.0
	Notes:				14	Float (#0	cells x Cell lim	n ka)	23	003	00:10:00	360.0	IDC Lim	(La): 275.0
ptional User notes					-	Discharg	e (#Cells x C	Cell lim la)	15	004	00.15:00	310.0	* 100m	IV = 100.0 h
/	Select	Cell #	Time	Cell VDC	Time	Cell VDC	Time	Cell VDC	Time	Cell VDC	Time	Cell VDC	Time	Cell VDC
	0	1	00:00:00	2.447	00:13:18	2.303	00:23:12	2 096	00:34:45	1.817	00:44:06	1.633	00.56.42	1.406
	(C)	2	00.00.00	2.547	00:13:24	2.286	00.23.15	2.096	00:34:52	1.818	00.44:11	1.633	00.56.48	1.406
	112	3	00:00:00	2.447	00-13-27	2.288	00.23.19	2.096	00:34:58	1.818	00:44:15	1 633	00:56:52	1.406
ata grid of cell	87	5	00:00:00	2.647	00:13:31	2 287	00-23-26	2 097	00:35:03	1.818	00:44:23	1.633	00.56.59	1,406
scharge data	275	6	00:00:00	2.447	00:13:35	2.287	00 23 29	2.096	00:35:08	1.818	00:44:27	1.633	00:57:03	1.406
Nick" colls to odit	0	7	00:00:00	2.447	00 13:37	2.288	00.23.32	2.096	00:35:12	1.818	00.44.31	1.633	00:57:07	1.406
		8	00:00:00	2:497	00:13:40	2.288	00/23/35	2 096	00:35:16	1.817	00:44:35	1.533	00:57:11	1.306
	12	9	00:00:00	2.447	00:13:43	2.289	00:23:38	2 096	00:35:20	1.817	00:44:39	1 633	00:57:15	1.406
	-	10	00:00:00	2.448	00:13:45	2.289	00:23:41	2.096	00:35:24	1.818	00:44:42	1 633	00:57:19	1.406
	121	Average	00:00:00	02.482	0.13.32	2 289	0:23:26	2.096	0:35:05	1.818	0.44.24	1.623	0:57:01	1.396
										1 10 a 10 m				and the first sector in the sector of the se



limits (if data available) Load current data

options & limits (if data available) "Click" cells to edit

(i) Add report information and parameters:

• # of Cells

Number of cell float voltages (NOT User Editable).

- Test Date
- Date on which discharge test was started (User editable).
- Start Time

Time which discharge test was started (User editable).

Report Title

(Optional)

- Technician Name
- (Optional)
- Battery Type

(Optional)

User Note

(Optional)

(ii) Enter/Edit "End of Test" information

(This is the time that the discharge test is complete) Select either:

- DLV-Pro "Stop Test" time-stamp
- Last DLV-Pro measurement
- User Input (time in minutes)

(iii) Enter/Edit cell voltage thresholds (Optional)

- Float & discharge (hi), cell voltage readings above are highlighted in *RED*.
- Float (lo), cell voltage readings below are highlighted in BLUE.
- Discharge (lo), cell voltage readings below are highlighted in BLUE.

Battery/string voltage are calculated from the number of cells and the various cell thresholds

- (iv) Select hydrometer data (Optional)
 - Include Float Readings
 - Edit/enter float hydrometer limits for SG & temperature (optional)
 - SG/T limits (hi), SG/T readings above are highlighted in RED.
 - SG/T limits (hi), SG/T readings below are highlighted in BLUE.
 - Include Final Readings

Edit/enter float hydrometer limits for SG & temperature (optional)

- SG/T limits (hi), SG/T readings above are highlighted in RED.
- SG/T limits (hi), SG/T readings below are highlighted in BLUE.
- (v) Select load current data(Optional)Select either:
 - None
 - User Input
 - (Enter average load current)
 - Time-stamped data
 - Enter/edit load current limits (optional)
 - Load current limit (hi), readings above are highlighted in RED.
 - Load current limit (lo), readings below are highlighted in BLUE.
- (vi) Review/Edit test data:

The User can now scroll through the detailed test data and edit/correct any cell's erroneous data. Simply click and edit the appropriate cell in the data grid.

7.7.1 Generate Selected Report



Select up to 4 cells (including average cell data) and click the "Selected Report" button.

The User can generate multiple reports, selecting a different combination of cells each time.



To save the report to Excel or PDF format, click the "**Save As"** icon in the Report header.

7.7.2 Generate General Report

Click the "General Report" button.





To save the report to Excel or PDF format, click the **"Save As"** icon in the Report header.

7.7.3 Generate Animated Report

Click the "General Report" button.





7.7.4 Export Data to Excel

Click the "Export to Excel" button.

	X	J	-	▼ sampl										
		File Hom	ne Insert	Page Layout	Formulas	Data	Review V	ew Devel	oper					
		A Cut	c	alibri	· 11 · ;	A* A* =	= = *	- = w	rap Text	General		-		Normal
	Pa	iste 🥑 Form	at Painter	B I U -	ш • 🤌 •	<u>A</u> - =	== 0	# 🖾 M	lerge & Center		6 • Si8	28 Conditi	onal Format	as Check C
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		C12	- (- fx	1.301									
		A	В	с	D	E	F	G	н	1	1	K	L	M
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	4	Filename:		<not saved<="" td=""><td>></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td></not>	>									
ncluding report	5	Technician	1:	Technician I	Name									
	6	Batt. Type		VRLA										
nformation and	7	Date:		12/6/2013										
parameters is	8	Test Lengt	h (min):	55										
	9	Num Cells	1	10										
JPHONAL	10	Cell Thres.	(VDC):	2.45										
	11	Batt. Thre	s.(VDC):	24.5										
	12	SG Limit (h	ni):	1.301										
	13	SG Limit (l	o}:	1.1										
	14	Temp. Lim	iit (hi):	80										
	15	Temp. Lim	it (lo):	50										
	16													
	17	Cell #	Time	Cell VDC	Time	Cell VDC	Time	Cell VDC	Time	Cell VDC	Time	Cell VDC	Time	Cell VDC
	18	1	0:00:00	2.447	0:13:18	2.303	0:23:12	2.096	0:34:45	1.817	0:44:06	1.433	0:56:42	1.406
	19	2	0:00:00	2.547	0:13:24	2.286	0:23:15	2.096	0:34:52	1.818	0:44:11	1.633	0:56:48	1.406
	20	3	0:00:00	2.44/	0:13:27	2.286	0:23:19	2.096	0:34:56	1.818	0:44:15	1.633	0:56:52	1,406
	21	4	0:00:00	2.44/	0:13:29	2.28/	0:23:22	2.096	0:34:59	1.818	0:44:19	1.033	0:50:55	1.406
	21	5	0:00:00	2.647	0:13:31	2.28/	0:23:26	2.097	0:35:03	1.818	0:44:23	1.633	0:56:59	1.406
	23	5	0:00:00	2.447	0:13:35	2.28/	0:23:29	2.096	0:35:08	1.818	0:44:27	1.033	0:57:03	1,406
	24	/	0.00.00	2.447	0.13:37	2.288	0.23:32	2.090	0.35-16	1.018	0:44:31	1.033	0.57:07	1.400
	25	0	0.00.00	2.497	0:13:40	2.200	0.23:33	2.090	0.35.10	1.01/	0.44.35	1,535	0.57:11	1.306
	20	10	0.00.00	2.447	0.13:45	7 780	0.23.30	2.090	0.35.20	1 818	0.44.39	1.033	0.57.10	1.406
	2/	10	0.00.00	2,440	0,13,43	2.209	0.23.41	2.090	0.33.24	1.010	0.44.42	1.055	0.57.19	1.400
	20	Average	0:00:00	2.482	0:13:32	2 280	0:23:26	2.095	0:35:05	1,818	0:44:24	1.603	0:57:01	1 396
	30	Sum (VDC)	0.00.00	24.9	0.13.32	22.89	0.23.20	20.961	0.33.03	18,177	0.11.24	16.03	0.37.01	13.96
	31	5 ann (+ 0 C)		2.4.0		22,05		201301		1011//		10.00		10,90
	32	Notes:		<comments< td=""><td>></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td></comments<>	>									
	33													
	3.0													

The User will be prompted to include/exclude report parameters and to enter a file name.

7.8 Step 8: Save Cell Discharge Report(s)

Click the **"Save"** button to save the cell discharge test report into the Winmeter 5.1 battery database.

(i) Select an **existing customer directory** or **"<add new>"** to add a new customer directory into the Winmeter 5.1 database.

Select Battery Data Disch	Add New Customer		
Select File Customer Directory:	New Customer:		
	ОК	Cancel	

(ii) Select an **existing string directory** or **"<add new>"** to add a new string directory into the Winmeter 5.1 database.

Select File				
Customer Directory:		String Directory:	Filename:	
Samples	•	String 1-2		•

(iii) Select either an **existing filename** or **"<next filename>"** to create a new discharge test file.

Selecting an existing filename will cause the old test file to be overwritten!

Select File	T Next Filename	
Customer Directory:		ime:
Samples	Next Filename: String1-2_002.ddf	filename> 👻
	OK	

(iv) Next, click the **"OK"** button to **save** the report.

Customer Directory:	String Directory:	Filename:
Samples	✓ String1-2	 String1-2_002.ddf

The Discharge Test is now **saved** into the Winmeter 5.1 database.

	U Edit/Viev	Existing B	attery Discha	arge Test	Collinguation of	province of	Stat Advances of the state							
	Database	Information	n			End of Test	t (minutes)			SG/T Lin	11			
Database	Custome	C same	les			O DEV50	"Stop test"	timestamp	0	[] Inclu	ide Float Rei	adings [Include Fi	val Readings
narameters of	String:	String	1-2			C Last D	LV50 measu	urement	01:01:00		1301	1 100	SG Limit 1	100 LO
	Filename	: String	1-2_001.ddf			O Llear Ir	anut (time in	minuton	55	T.Limi	080.0	050.0	T Limit, In	15.0 050.0
saved file.						Costs II	iber franse av	minutes		125511251	000.0	000.0		1010 0000
	Report In	formation				Voltage Lim	nts			Select Lo	ad Current D	oto		
Optional report	# of Cell	c 10				Cell Voltes	e Threshold	ds:		None				
nformation and	Test Dat	e: 6/12	2013			Float & D	Discharge (H	fi):	2.45	© 350	User Inp	ut - Enter A	vg Discharg	e IDC
	Stort Tin	ne: 12.40.	00 PM 💽			Float (Lo	5):		23	 Time 	Stamped Da	sto		Avg: 321.7
parameters.	Title:	Repo	rt Title		_	Dischard	ae (Lo):		1.5	Index	Time	ldc	*	Max: 380.0
	Technici	an: Tech	nician Name							001	00.01.00	320.0	-	Min: 280.0
	Battery	ype: VHLA	·	•		Battery/St	ring Voltage	Threshold	ls:	002	00:05:00	310.0	IDC Lim	(Hi): 365.0
Optional notes	<comment< td=""><td>\$></td><td></td><td></td><td>*</td><td>Float (#C</td><td>cells x Cell lin</td><td>n lo)</td><td>23</td><td>003</td><td>00:10:00</td><td>360.0</td><td>IDC Lim</td><td>(Lo): 275.0</td></comment<>	\$>			*	Float (#C	cells x Cell lin	n lo)	23	003	00:10:00	360.0	IDC Lim	(Lo): 275.0
	7				*	Discharg	e (#Cells x C	Cell tim to)	15	004	00:15:00	310.0	* 100r	nV = 100.0 k
	Select	Cell #	Time	Cell VDC	Time	Cell VDC	Time	Cell VDC	Time	Cell VDC	Time	Cell VDC	Time	Cell VDC
	V	1	00.00.00	2.447	00:13:18	2.303	00:23:12	2.096	00.34:45	1.817	00.44.06	1.433	00.56.42	1.406
	121	2	00 00 00	2.547	00 13 24	2.286	00.23.15	2.096	00.34.52	1.818	00.44.11	1,633	00.58.48	1.408
		3	00:00:00	2.447	00:13:27	2.286	00:23:19	2.096	00:34:56	1.818	00:44:15	1.633	00.56.52	1.406
ata grid of Cell		4	00:00:00	2.447	00:13:29	2.287	00:23:22	2.096	00:34:59	1.818	00:44:19	1.633	00:56:56	1.406
ischarge Data		5	00:00:00	2.647	00.13.31	2.287	00:23:26	2.097	00:35:03	1.818	00:44:23	1.633	00.56.59	1.406
ischarge Data		6	00:00:00	2.447	00:13:35	2.287	00:23:29	2.096	00:35:08	1.818	00:44:27	1.633	00:57:03	1.406
'Click" cells to edit).			00.00.00	2.447	00.13.37	2.288	00.23.32	2.096	00.35.12	1.818	00:44:31	1.633	00.57.07	1.406
	(M.)	0	00.00.00	2.487	00 13 40	2 200	00.23.33	2.096	00.35.16	1.017	00.44.30	1.000	00.57.11	1.300
		10	00:00:00	2.448	00:13:45	2 289	00:23:41	2.096	00:35:24	1.818	00:44:42	1.633	00:57:19	1.406
					00110.10				00.00.01			1.000		
	2	Average	00.00.00	02.482	0:13.32	2.289	0.23.26	2.096	0.35.05	1.818	0.44.24	1.603	0.57.01	1.396
		Sum (V		024.8	10102007	22.89		20.961		18.177		16.03	1	13.96
	Selected		[]	General		Animat	ted	í	Export to	1				Gue
	Report			Report		Repo	irt		Excel		5	ove		Close
Report filename	Saved : C:\P	rogram File	es (x86)\ETG	\Winmeter	50\Battdata	samples\S	tring1-2\Str	ring1-2_00	1.ddf					

The discharge test file is now **saved into the Winmeter 5.1 database** and the User can safely **"Close"** the Winmeter 5.1 software.

8.0 Connecting the DLV-Pro to PC/Winmeter 5.1

(i) Connect the DLV-Pro to a PC (via USB cable) with Winmeter 5.1 software installed.

If the Winmeter 5.1 Auto-start software is not enabled, **RUN** the Winmeter 5.1 Software.

If the "Voltlogger Plus Interface" does not initiate automatically, select "Download Device" -> "DLV-Pro (search for device)".

Once connected, the DLV50 will display "**DLV-Pro <-> PC**" and sync contained data, threshold and date & time settings with Winmeter 5.1.



Once data transfer is complete the user can easily:

- (A) Select & delete any/all strings that contain obsolete data.
- (B) Click "Edit V & SG Limits" tab to edit/remove thresholds (voltage, SG & temp.) for any string.
- (C) Double-click any data row to preview string data.
- (D) Click "Save" to begin the report generation process.

<u>NOTE : Please refer to the Winmeter 5.1 Help file for additional</u> <u>instruction for battery test report generation</u>.

9.0 Upgrading DLV-Pro Firmware

- (i) Place the DLV-Pro into bootloader mode:
 - Turn the DLV-Pro off
 - Push and continue to hold the right soft key below the display
 - Turn the DLV-Pro ON
 - The DLV-Pro will beep twice but the display will remain blank (this indicates the unit is in bootloader mode)

The DLV-Pro will restart in normal mode in ~ 30 seconds if not connected to a PC via

<u>Close</u> Winmeter 5.1 (if open)

- (ii) Connect the DLV-Pro to a PC via the supplied USB cable.
- (iii) Ensure that Winmeter 5.1 is **NOT** running
- (iv) Run the bootloader program "*DLV-Pro Bootloader Rev02.exe*", typically located here "*C:\Program Files (x86)\ETG\Winmeter50*"

Connect	Load Hex File	Program

- (v) Click "Connect" on the Bootloader program
- (vi) Click "Load Hex File" and select the new DLV-Pro 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 DLV-Pro firmware has been updated, the Device Bootloader software will close and the DLV-Pro will restart with the new firmware.