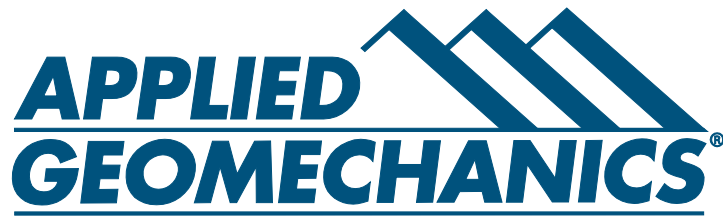


VW SINGLE CHANNEL DATALOGGER



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1 OVERVIEW

The Applied Geomechanics Vibrating Wire Single Channel Datalogger was designed to be very simple to use, be deployable in harsh environments and to be as compact as possible. The user-friendly software and standard AA batteries allow easy downloading of the data and maintenance in the field. Even users with very little experience with Geotechnical Instruments will be able to connect, download data and change settings with a matter of a few inputs.

2 QUICK-START INSTRUCTIONS

The following is a brief outline with references to other parts of this manual to get you up and running quickly with the APPLIED GEOMECHANICS Single Channel VW Datalogger:

2.1 DATALOGGER SETUP

1. Insert the supplied CD-ROM into your drive. The disk contains an auto-run feature. Click on the install software button.
2. Follow the on-screen instructions to install the software. The default directory is: **C:\Program Files\AppliedGeomechanics\LogViewer**
3. Remove the cover of the datalogger by the four Phillips screws.
4. Insert the stripped ends of the cable for the VW Transducer through the cable gland and attach them to the terminal strip. Where:

Terminal ID	Wire Colour
C1	Red
C2	Black
T1	Green
T2	White
SH	Bare (shield)

5. Insert two standard 'AA' Alkaline batteries into the holder.
6. Using the supplied COM cable, connect the datalogger to your computer's serial port. If you do not have a serial port, place a USB to serial adapter in line with the COM cable. These adapters are available from most electronics stores or from Applied Geomechanics Ltd. (part#: 01-CUSB-232A). Refer to section 6.5 for USB to serial port adapter configuration help.
7. Launch the software. Once connected, the port and status indicators turn green and the *Status* screen should display logger information. See Section 6 for connection troubleshooting.
8. Navigate to the *Setup* tab and setup the datalogger to the desired parameters. Once the desired parameters are set, press the *Apply* button to apply the changes and start logging.
9. If you wish to record the data in specific Engineering Units, press the *Eng Units* tab enter the appropriate parameters and press the *Save & Apply* button to update the logger.
10. If desired, the sensor current reading can be monitored in real time by selecting the *Monitor* tab.
11. Under the *Status* tab, check to make sure the parameters are correct and that the logger is either *logging* or there is a *log pending*.
12. Exit the software and disconnect the COM cable.

-
13. The datalogger should now be taking readings. Return when desired to download the data. Make the habit of checking the battery voltage every time you connect.

2.2 DOWNLOADING DATA

1. Connect the COM cable to your computer and the datalogger and launch the software. If the connection is successful, the port and status indicators turn green and the *Status* screen should display logger information.
2. Press the *Collect Data* button to download the data. A data file (*.csv) will automatically be created in the data directory. The default data directory is: **My Documents\LogViewer**
3. After downloading, the program will prompt you whether you would like to erase the existing data on the logger or keep appending to existing records. Alternatively, if you wish to erase the old data and continue logging with the same parameters, press the *Setup* tab and press *Apply*.
4. If you wish to keep the old data on the logger and continue logging, disconnect the COM cable.
5. If you wish to change any logging parameters, do so under the *Setup* menu and press *Apply* to save the changes.
6. Disconnect the COM cable when finished.

2.3 HELP SYSTEM

Extensive help system can be activated anytime by pressing F1 or help icon. Answers to common problems and troubleshooting tips can be found by browsing help topics or searching using keywords.

3 LOGGER MENU

Once connected to the datalogger, the software should automatically establish communication link and display connected status. If this does not occur, verify the port number and communication cable or refer to Section 6.1 for more help.

The LogViewer user interface contains six tabs: *Status*, *Setup*, *Monitor*, *Eng Units*, *Options* and *Data View*. Each tab option is explained in detail below. A Help button is available in the bottom right corner, which launches the appropriate help files when pressed.

3.1 STATUS

The status tab contains three main components: *Logger*, *Sampling* and *Battery*.

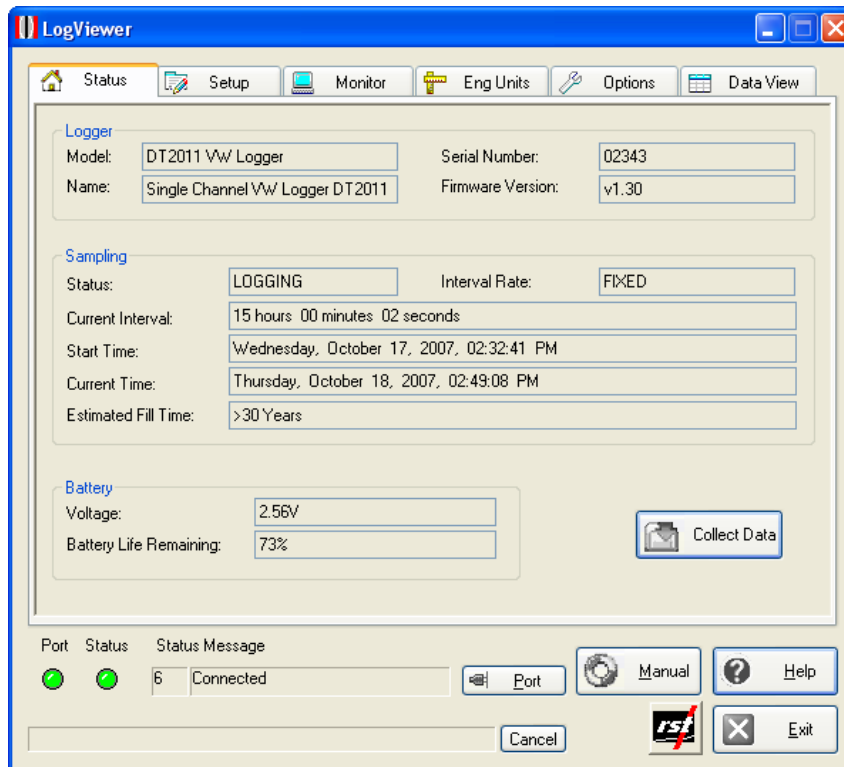


Figure 1: Status Tab

Logger

Provides information about the currently connected datalogger. This includes the model, name, serial number, and firmware version. Ensure that the serial number matches what is expected (in this example it is 02343). If it does not, check the status bar at the bottom of the screen to ensure a connection with the logger has been established.

Sampling

Provides information about the status of the logger. This includes whether or not it is logging, the log interval, and various time parameters.

Battery

Provides information on the battery voltage and the estimated battery life.
To ensure uninterrupted operation, replace batteries when voltage drops below 2.0 Volts.

Collect Data

If the datalogger has already been configured to collect data at a specified interval, the *Collect Data* button can be pressed. The program will download the data (a progress bar will be displayed) and automatically write it to a *.csv file. Please see section 4 for the *.csv file format.

Note

When pressing the *Collect Data* button, after the data download completes, the program will give a choice to keep or erase the data currently contained in the datalogger. If the datalogger memory is not erased, the next time the data is collected (and no parameters have been changed) it will download the current readings and all of the previous data to a *.csv file.

The current memory can also be erased by pressing the **Apply** under the *Setup* menu. The program will prompt you to confirm the erasing of data from its memory.

3.2 SETUP

The setup tab contains three main components: *Interval*, *Logger Options* and *Clock Options*.

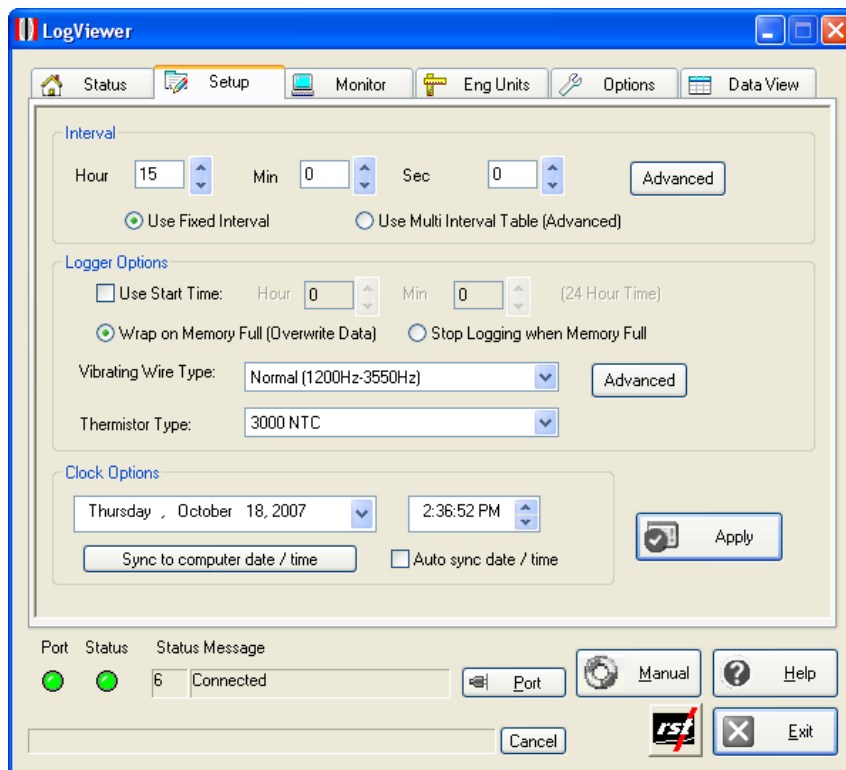


Figure 2: Setup Tab

Interval

This section is used to set the logging interval. *Fixed Interval* and *Multi Interval* options are available. The fixed logging interval can be invoked by choosing the “Use Fixed Interval” radio button, and set within the main setup tab. Arrow buttons allow the user to scroll up or down preset values.

To setup the logger with multiple intervals, select the *Use Multi Interval Table (Advanced)* radio button. Clicking the “Advanced” button launches the Multi Interval Table dialog, where up to 12 custom, multiple intervals can be applied.

Multi Interval Table					
	Hour	Min	Sec	Iterations	Interval Fill Time
Interval #1:	15	0	10	3000	1875d 08h 20m 00s
Interval #2:	10	0	20	2000	833d 19h 06m 40s
Interval #3:	0	0	40	1500	0d 16h 40m 00s
Interval #4:	0	1	0	1000	0d 16h 40m 00s
Interval #5:	0	2	0	500	0d 16h 40m 00s
Interval #6:	0	5	0	0	83d 08h 00m 00s
Interval #7:	0	0	0	0	
Interval #8:	0	0	0	0	
Interval #9:	0	0	0	0	
Interval #10:	0	0	0	0	
Interval #11:	0	0	0	0	
Interval #12:	0	0	0	0	
Totals:				8000	2794d 13h 26m 40s

Buttons: Exit & Save, Cancel, Update Totals

Figure 3: Multi Interval Table

The hour, minute, second and number of iterations per interval must be specified.

Note

Each interval **MUST** have an iteration except the last iteration which must be set to zero. This tells the program that the logger will continue at the last iteration rate.

There is a maximum of 32,000 iterations for all intervals. The dialog features an *Interval Fill Time* field, which allows the user to see the exact time, relative to the start time of the interval, the interval iterations will finish. To update both the *Interval Fill Time* and *Total Iterations field*, click the “Update Totals” button. To save changes, click the “Exit & Save” button.

Logger Options

Use Start Time: A check box can be selected to enable a custom start time. The hour and minute can be entered in 24-hour format.

Note

If a custom start time is entered and this time has already past, the logger will not start until 24 hours has passed. For example: If the current time is 13:01 and the start time is set to 13:00, the datalogger will not start logging data until 13:00 *the next day*.

If a custom start time is applied, i.e. for some time in the future, the *Status* will read *Log Pending* until that interval is reached.

Wrap on Memory Full (Overwrite Data): When the datalogger memory becomes full, it will overwrite itself.

Stop Logging when Memory Full: Datalogger stops collecting data when it reaches its memory storage limit.

Thermistor Type: A drop down menu allows the user to select the type of thermistor used in the vibrating wire instrument.

Vibrating Wire Type: A drop down menu allows the user to select from a list of preset sweep frequency settings. The software also allows a custom, user defined sweep frequency for use with non-standard vibrating wire sensors. To select this option, choose the "Custom (Advanced)" option from the drop down menu, click the "Advanced" button, fill in the required fields, and click Apply to save new settings.

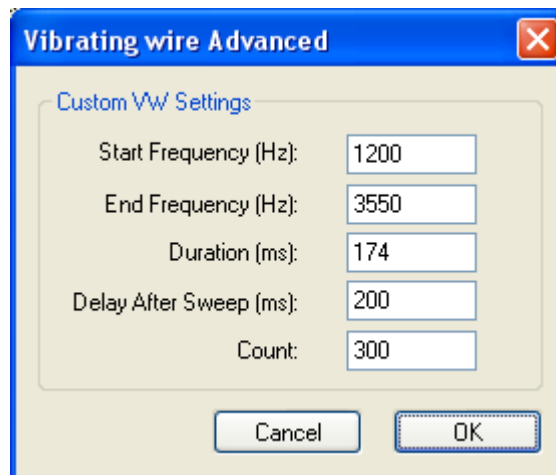


Figure 4: Custom Vibrating Wire Settings

Clock Options

Allows the user to set the date and time of the datalogger. Pressing the *Sync to Computer Date / Time* and clicking *Apply* synchronizes the datalogger clock to that of the PC it is currently connected to. Checking the *Auto Sync Date / Time* checkbox will update datalogger internal clock each time *Apply* button is pressed.

Apply Button

After any changes have been made on the datalogger *Setup* screen, pressing the *Apply* button saves these changes and downloads them to the datalogger's memory.

3.3 MONITOR

Selecting the monitor tab sets the datalogger into monitor mode. The top portion of the screen reports in B-units ($f^2 \times 10^{-3}$) and the bottom portion reports the thermistor temperature in degrees Celsius.

If successfully connected to the datalogger, the sensor reading and temperature reading is updated approximately once per two seconds. Clicking the check boxes changes the display to Engineering Units, or degrees Fahrenheit.

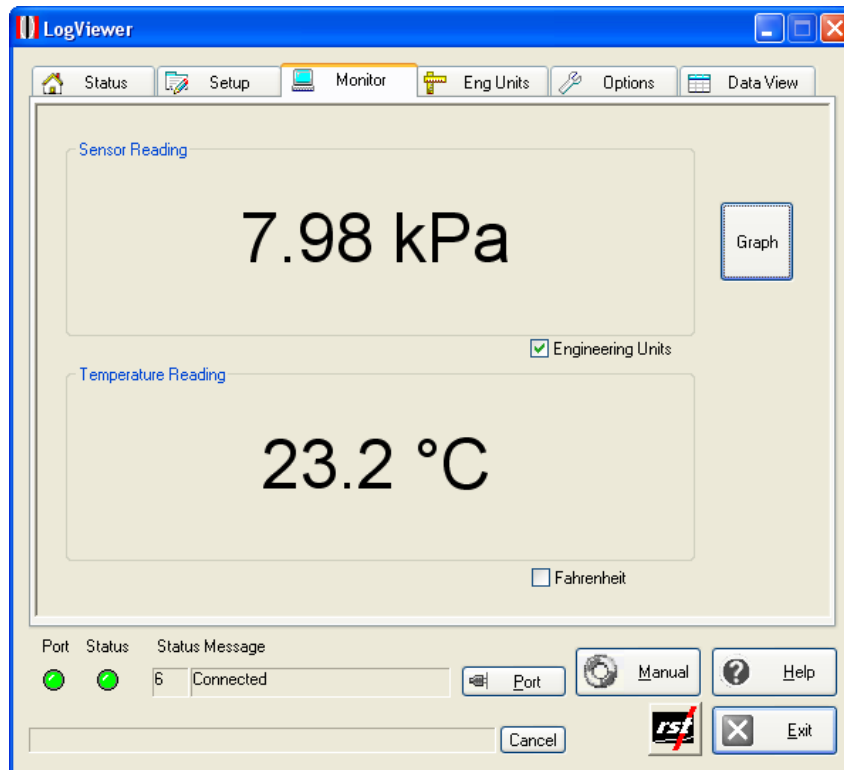


Figure 5: Monitor Tab

Note

Engineering Units are only available when sensor calibration data and conversion method is set in Units page. Please see section 3.4 for the instructions on entering calibration data.

Until communication is established with the datalogger, the program will display "----" in Sensor Reading and Temperature Reading fields.

When Sensor Reading is outside of the valid range, "RANGE_ERR" will be displayed.

Graphical Monitor

The Graphical Monitor button invokes the datalogger graphical monitor. The graphical monitor displays the recent monitor readings in a Sensor Reading vs. Time graph. If successfully connected, the graphical monitor is updated approximately once every two seconds. The real time sensor reading is displayed below the graph window. Two modes of Y-axis adjustments are provided: *Range* and *Min-Max*.

Range mode: pre-set default range is applied, uncheck Auto and type in desired range if desired.

Min-Max mode: when *Auto* checkbox is selected, minimum and maximum Sensor Reading values are adjusted automatically to keep the whole graph visible. Uncheck the *Auto* checkbox to enter required values manually.

The time range (x-axis) can be adjusted in the range between 1 minute and 2 hours).

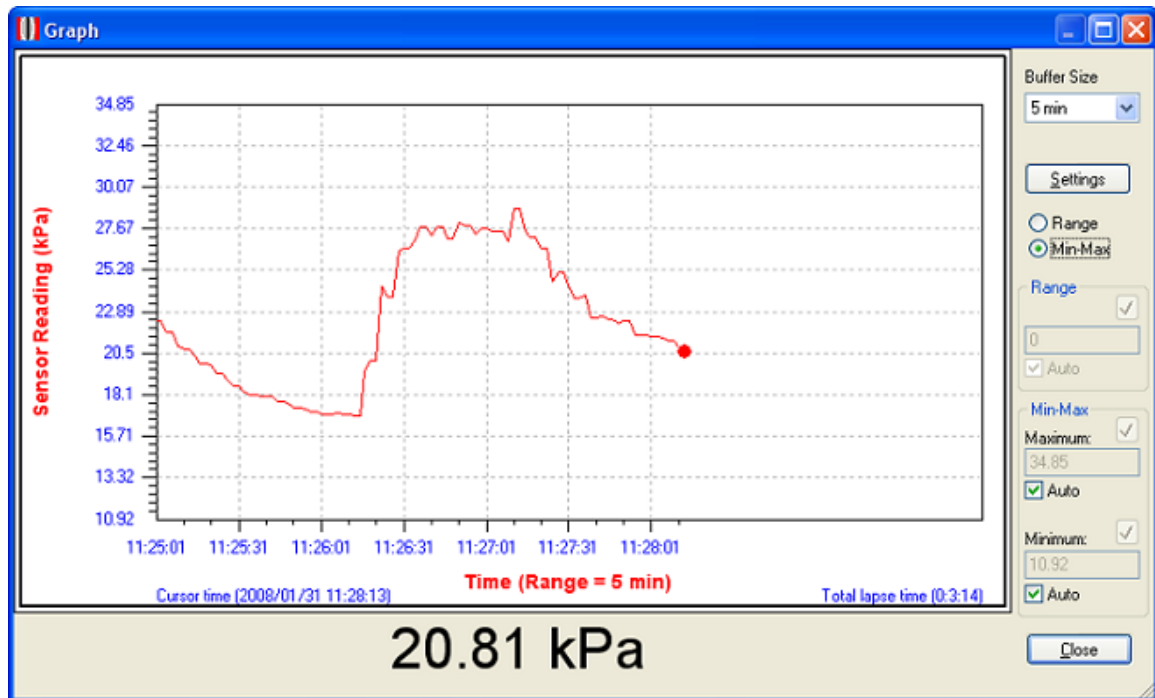


Figure 6: Graphical Monitor

The *Settings* button launches the Graphical Monitor Options dialog, which allows the user to manipulate the graph.

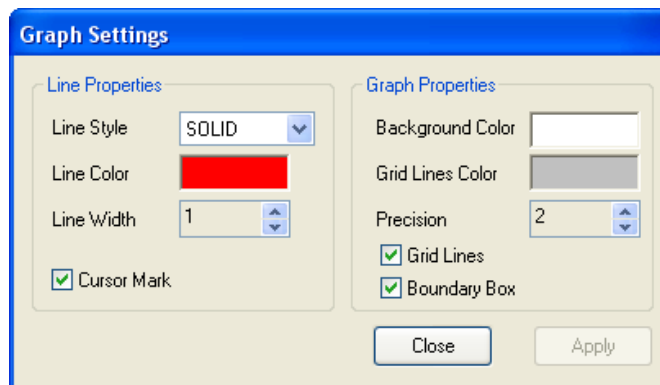


Figure 7: Graphical Monitor Options

3.4 ENGINEERING UNITS

Often the user may wish to report the readings directly in engineering units, rather than B-units ($\text{ft}^2 \times 10^{-3}$). Data required for the conversion to engineering units is always found on the calibration sheets for the transducer.

Each transducer is shipped from the factory with a calibration sheet. If you have not received a calibration sheet, or the sheet has been lost, please contact Applied Geomechanics and a copy will be faxed or e-mailed to you. In order to apply any changes on the Eng Units tab, the *Save & Apply* button must be pressed.

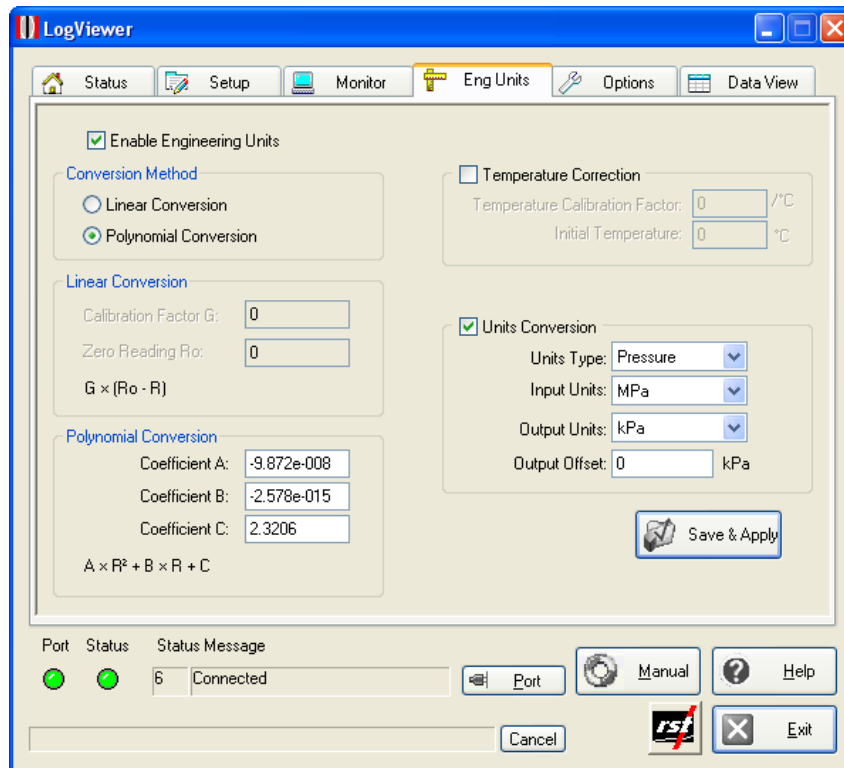


Figure 8: Eng Units Tab

Conversion Method

The user is given an option to apply either a *Linear* or *Polynomial* Conversion. If *linear conversion* is selected, input the provided Calibration Factor and Zero Reading into the appropriate boxes.

If *polynomial conversion* is selected, input the provided coefficients (A, B & C) into the appropriate boxes.

In each case, equations used for calculations are shown for a reference.

Temperature Correction

When the Enable Temperature Correction box is checked, the software will apply a temperature correction to the data. This requires the user to enter in the temperature correction factor and an initial temperature which is found on the calibration sheet for that particular instrument.

If the calibration sheet is missing, please contact Applied Geomechanics and a copy of the calibration sheet can be faxed or e-mailed to you.

Units Conversion

Units Type: Choose pressure or distance using the drop-down menu.

Input Units: These are the units of the calibration constants you inputted into either the linear conversion or polynomial conversion methods. In general, the calibration constants reported on the calibration sheets are either in kPa/B unit or psi/B unit. In the case of strain gauges, this could be mm/B unit.

Output Units: Select the appropriate output units from the drop-down list. The conversion will be done automatically resulting in desired units displayed in Monitor tab and recorded in downloaded file data.

Output Offset: This is a user defined offset value. Under certain circumstances, the user may wish to enter in the elevation of the pressure transducer. In this way the reported pressure will be correlated to a reference elevation (i.e. above sea level).

Save & Apply

As a reminder, whenever **ANY** changes are made under the Engineering Units tab, the Save & Apply button must be pressed in order to update the logger with the appropriate information.

3.5 OPTIONS

The Options tab enables the user to change LogViewer settings and access advanced features.

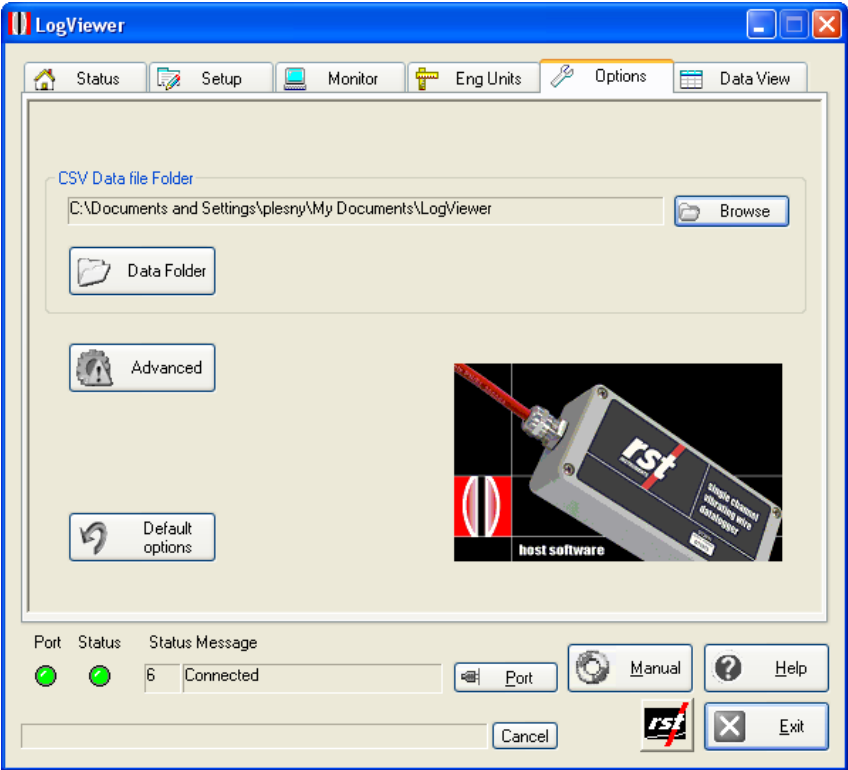


Figure 9: Options

CSV Data File Folder

The location of *.csv file data folder can be changed using *Data File Folder* dialog box. Press *Browse...* to change or create new folder. By default, data files are saved to:
My Documents\LogViewer

Advanced

Advanced Logviewer options are to be used with assistance of Applied Geomechanics technical staff in case of corrupted data retrieval.

Default Options

Changes modifiable software options to their default values.

3.6 DATA VIEW

The Data View tab allows quick preview of LogViewer data files.

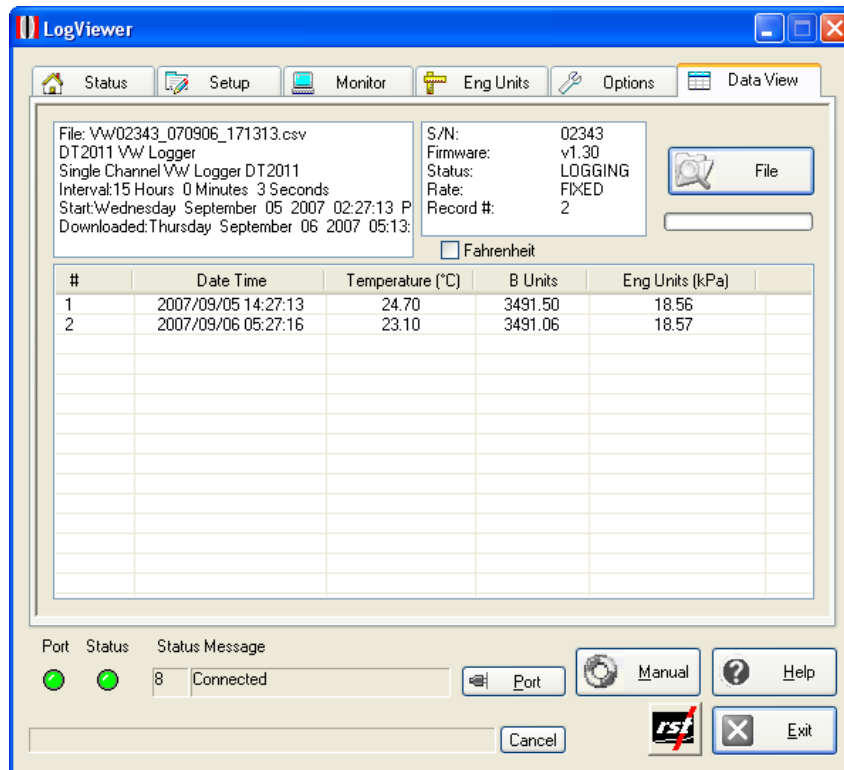


Figure 10: Data View

Note

Data View displays major datalogger settings and all saved data records. Use text file viewer or spreadsheet program (ex. MS Excel™) to see entire file.

4 DATA FILES (*.CSV)

Whenever the *Collect Data* button is pressed under the *Status* tab, the software will collect all the current data stored in the memory of the datalogger. A progress bar will be displayed showing the status of this collection.

The software will automatically write the data to a *.csv file in the data directory. The default data directory is **My Documents\LogViewer**. Data directory can be changed using Data File Folder dialog box. The *.csv file has the following format:

serialnumber_yymmdd_hhmmss.csv

This file can then be opened directly with Microsoft Excel™ or other spreadsheet programs. A new file will be created each time the data is collected. It is the user's responsibility to copy data into a single spreadsheet if desired.

The following is how the data appears in Excel:

The screenshot shows a Microsoft Excel window titled "Microsoft Excel - VW01776_050713_131424.csv". The spreadsheet contains the following data:

	A	B	C	D	E	F
1	Model	DT2011 VW Logger				
2	Name	Single Channel VW Logger DT2011				
3	Serial Number	1776				
4	Firmware Version	v1.07				
5	Sampling Status	LOGGING				
6	Sampling Rate	FIXED				
7	Current Interval	0 Hours 0 Minutes 5 Seconds				
8	Start Time	Wednesday July 13 2005 01:09:00 PM				
9	Current Time	Wednesday July 13 2005 01:14:24 PM				
10	Battery Voltage	3.02V				
11	Battery Life Remain	100%				
12	Number Of Records	64				
13	Engineering Units	Enabled	Linear Conversion CF=0.02 ZR=9125.00			
14	Temperature Correc	Enabled	TempCF=-0.01 InitialTemp=25.30			
15	Units Conversion	Enabled	Pressure Input=psi Output=kPa Offset=0.00			
16						
17	Date/Time	Eng Units	Temperature	B Units		
18	7/13/2005 13:09	12.27	23.64	9047.21		
19	7/13/2005 13:09	12.27	23.66	9047.21		
20	7/13/2005 13:09	12.26	23.67	9047.21		
21	7/13/2005 13:09	12.34	23.68	9046.75		
22	7/13/2005 13:09	12.26	23.67	9047.21		
23	7/13/2005 13:09	12.26	23.67	9047.21		
24	7/13/2005 13:09	12.34	23.67	9046.75		
25	7/13/2005 13:09	12.26	23.68	9047.21		
26	7/13/2005 13:09	12.33	23.69	9046.75		
27	7/13/2005 13:09	12.26	23.7	9047.21		
28	7/13/2005 13:09	12.33	23.69	9046.75		

Figure 11: Sample Data File

Note

When sensor reading is outside of the valid range, the "99999" value will be recorded as the Eng Units and B Units data.

5 CHANGING THE BATTERIES

The single channel VW Datalogger uses standard 'AA' alkaline batteries which are readily available. The following steps outline the procedure to change the batteries:

1. Connect to the datalogger via the COM or USB cable and download the data.
2. Disconnect from the computer and remove the top cover (4 Phillips screws).
3. Remove the batteries from the carrier and replace with fresh ones. If the unit is being used in a cold environment, APPLIED GEOMECHANICS also offers Lithium-Ion AA cells.
4. Replace the lid.
5. Connect to the PC again and navigate to the *Setup* screen. Verify that the settings are correct and press the *Apply* button. *You must press Apply to reset the datalogger regardless if the setup parameters are changed or not.* Please see note below.

Very Important

Upon replacement of the batteries, it is important to connect to the datalogger and re-apply the datalogger setup settings. This re-initializes the datalogger and ensures that the time settings are correct. Failure to do this could result in improper time stamps after the batteries are replaced.

6 TROUBLESHOOTING

6.1 CONNECTION PROBLEMS

Upon launching, Logviewer software will try to connect to DT2011 Data logger using current communication settings. Once connected, the port and status indicators turn green and the *Status* screen should display logger information.

The connection status is displayed on status bar. If the connection fails (status indicators are red or yellow, or status screen shows no status data), take note of the message and number displayed, then find the corresponding description in the Table 1: Status Messages.

1. Port not open: The communication port is being used by some other application.
Solution: Close other windows applications that might be using serial port assigned to Logviewer. To change or verify port, click on *Port* button.
2. Connecting to the logger message continuously displayed.
Solution: Verify that the serial communication cable is connected and connections are tight. Replace logger batteries with fresh set.
3. State Errors, Reading Errors, Memory Read Errors: Verify battery voltage displayed on Status screen. Replace batteries if voltage falls below 2V. Check cable for damage. Replace serial communication cable if in doubt.

6.2 SOFTWARE STABILITY

The Logviewer real time readout relies on continuous data transmission over serial communication port. This transmission may be occasionally interrupted by other computer activity resulting with program freezing or displaying erroneous data. If this happens, Logviewer needs to be closed down and restarted. Check battery voltage regularly, low battery voltage (below 2V) might cause data transmission errors. Always close software when changing loggers or reconnecting serial communication cable.

6.3 DATA COLLECTION HELP

In case of accidental data loss, the Memory Dump feature can be used to save datalogger memory contents. Applied Geomechanics personnel can recover some or all customer data from dump files, providing data is not corrupted and it was not overwritten. Only raw data in B units can be recovered from dump files. Select Memory Dump in Advanced Options to write entire memory contents into a disk file in data folder.

Note

The Memory Dump feature is included for emergency memory content retrieval. Under any circumstances, memory dump files should not be used for data collecting.

6.4 STATUS BAR MESSAGES

The following table lists the status bar messages with descriptions.

#	Status Message	Description
1	Communication port open	Communication port is open
2	Unable to open communication port	Some other application is using this port
3	Connecting to the logger	Logviewer is trying to connect to the logger
4	Connection not established	Logviewer was unable to connect to the logger
5	Connection established to the logger	Logviewer was able to connect to the logger
6	Reading logger settings	All logger settings are copied to the Logviewer for display
7	Error during settings read	Error occurred during settings read
8	Idle	Idle time between status or data reads
9	New logger detected	Logger exchanged with another logger, Logviewer reset
10	Logger settings successfully read	All logger settings were successfully transferred to Logviewer
11	Error reading logger settings	Error occurred during reading logger settings
12	Connection Error	Connection attempts timed out
13	Reading logger memory	Logger memory contents is being copied to the Logviewer
14	Writing logger settings	All displayed settings are being transferred to the logger
15	Error during settings write	Error during settings write

Table 1: Status Messages

6.5 USB TO SERIAL PORT ADAPTER

If the host computer doesn't have serial port, the USB to serial adapter can be used to connect to single channel datalogger.

Note

Most USB to serial adapters need drivers to be installed. Consult your adapter manual for detailed instructions.

Microsoft Windows system assigns serial communication port to the USB to serial port adapter. Since the port number must be set manually in LogViewer port settings dialog, follow the steps below to find out the port number.

The following instructions are typical for Microsoft WindowsXP. The actual steps might slightly differ depending on version of MS Windows installed.

- Click on Start and open Control Panel.
- Choose System (switch to Classic View if System is not visible)
- In the Hardware tab, click on Device Manager.
- Expand the Ports (COM & LPT) branch
- Take note of the COM port number assigned to the USB adapter.
- On LogViewer main dialog, click on *Port* button. Select port number obtained in previous step.

For example Control Panel view, see the screenshot below.

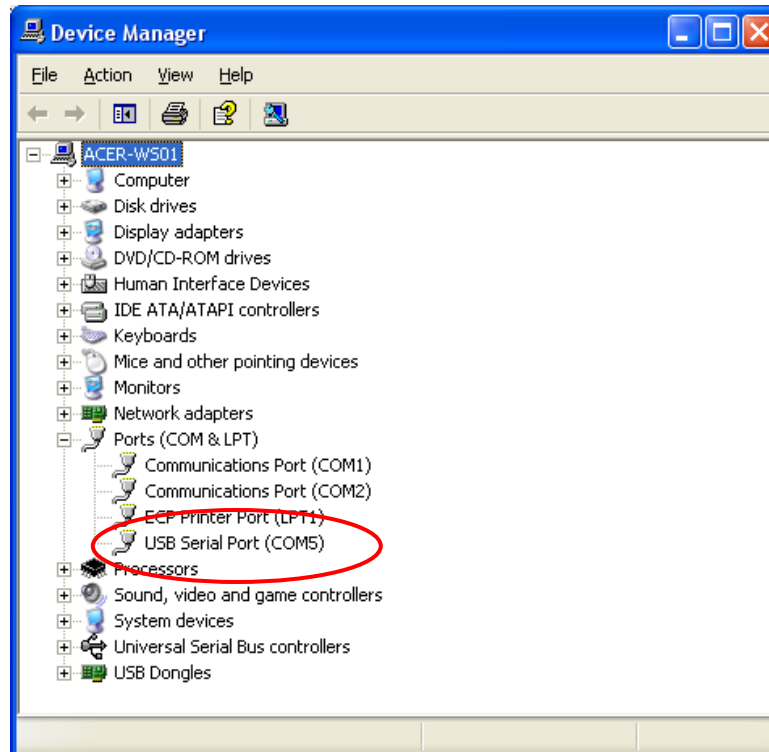


Figure 12: USB to Serial Port Adapter entry in Control Panel

In the above example, port #5 was assigned to USB Serial Port.