Operating manual

WLL-1 / WLL-2

Pressure transducer and data logger

ba75811e02 02/2011

Accuracy when going to press

The use of advanced technology and the high quality standard of our instruments are the result of a continuous development. This may result in differences between this operating manual and your instrument. Also, we cannot guarantee that there are absolutely no errors in this manual. Therefore, we are sure you will understand that we cannot accept any legal claims resulting from the data, figures or descriptions.



Note
The latest version of the present operating manual can be found on the Internet under www.WTW.com.

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1 Specifications

Logger:

Power supply:	2 x 9 V DC alkaline block batteries, type 6LR61 Standby current: typical 65 µA Logging current: 5 mA typical + sensor current
Operating temperature	-10 ºC to +85 ºC (may not apply to the battery)
Analog sensor inputs:	4-20 mA Resolution: 12-Bit, 4096 steps 1 channel + battery voltage monitor, 2nd channel reserved for temperature option Sensor warm-up time: programmable, 0-60 s
Sample modes:	- Fixed interval: programmable from 1 s to > 1 year - Fast mode: 10 samples per second - Logarithmic mode - Exception (log only on specified deviation from previous reading)
Storage capacity:	81759 record values, including battery voltage and dat/time
Communication ports:	USB type B Selectable Baud rates: Auto Detect or fixed, rates at 9600, 19200, 28800, 38400, 57600, 115200
Material:	Stainless steel and UV protected PVC
Dimensions:	29.2 cm (11 1/2 ") long x 4.8 cm (1 7/8 ") diameter
Weight:	450 g (16 oz), logger only with batteries

Pressure transducer:

Sensor element:	Silicone diaphragm, Wet/Wet transducer
Measuring range:	WLL-1: 0 - 4.5 m (0 - 15 ft) WLL-2: 0 - 9 m (0 - 30 ft)
Linearity and hysteresis:	±0.1 % FS
Accuracy:	Level: ±0.1 % FS at constant temperature ±0.2 % over 0 ° to 21 °C range (32 °-70 °F)
Overpressure:	2 x full scale range
Resolution:	Infinite (analog)
Outputs:	4-20 mA ±1 mA at full scale
Supply voltage:	10-36 V DC
Current draw:	Sum of sensor outputs
Warm up time:	50 ms minimum, recommended: 3 s
Operating temperature (compensated):	0 °C to 21 °C (32 ° to 70 °F) submerged, automatic barometric compensation
Material:	Stainless steel
Dimensions:	19 cm (7.5") long x 2.1 cm (0.8") diameter

Weight:	110 g

Cable:

Cable lengths:	WLL-1: 7.5 m (25 ft) WLL-2: 15 m (50 ft)
Conductors:	4 each 22 AWG
Jacket material:	PU
Cable O.D.:	7,8 mm
Vent tube:	HDPE
Shield:	Aluminium coated Mylar
Temperature range:	-30 ° to 85 °C (-22 to 185 °F)
Weight:	65 g/m (0.7 oz/ft)

2 System requirements

1. Desktop or Laptop computer with Windows 98, ME, 2000 or XP operating oystem
2. CD-ROM drive
3. USB port

Note that the software provided with the WLL Data Logger is for running on desktop and laptop computers only. Software for many popular Handheld PDA devices is available on the supplied CD-ROM. Special cables may be required.

3 Software installation

Global Logger installation: Insert the software installation CD and run the Setup program. This will install the Global Logger application in the Windows folder and automatically put the Global Logger icon on the desktop.

USB driver installation: With the installation CD in the CD-ROM drive and DC power applied to the logger, plug the USB cable into the data logger to open the Add New Hardware Wizard. *The menus that follow will look different for different operation systems but the procedure is the same.* ***Do not allow the Hardware Wizard to automatically search for the driver. Instead, specify the location (CD-ROM).*** If a generic driver gets, or has been previously installed, it must be uninstalled before proceeding by using the Add or Remove Programs section of the Control Panel. Instead, click the Search External Media box or Specify a Location box and install the driver from the CD-ROM. Running the Setup program that installs the Global Logger software also installs a folder with the driver in it. This location can also be specified if the CD-ROM is not available; although, it is recommended that the driver be installed at the same time the Global Logger is installed.

The following menus apply to the Windows XP operating system.

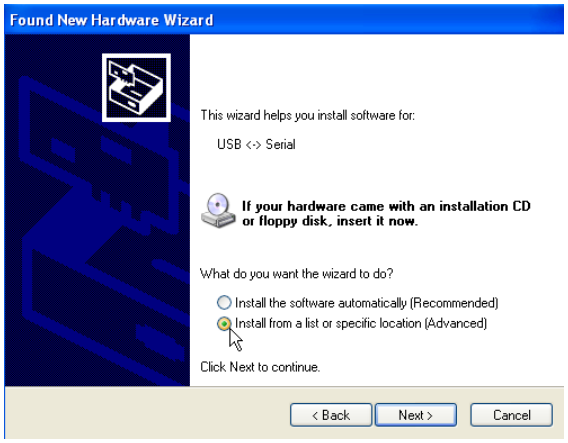
1) Do not let Windows search for software. Click the option field,“No, not at this time” when asked if Windows Update can search for software.

Click *Next*.



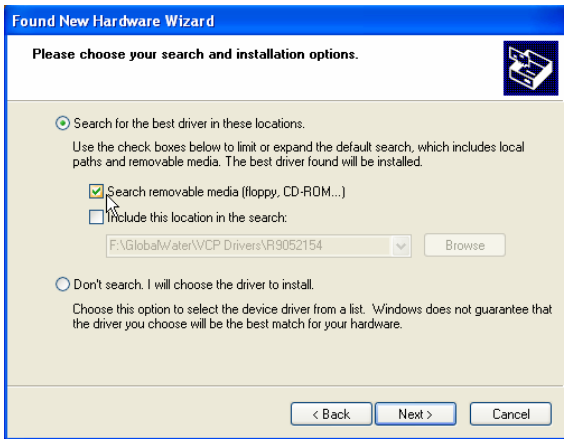
2) Do not let Windows automatically install the software. Click the option, “Install the software from a list or specific location” *(for advanced users)*.

Click *Next*.



3) Specify the location of the driver. Make sure the Global Logger CD-ROM is in the CD drive, and click “Search removable media” only.

Click *Next*.



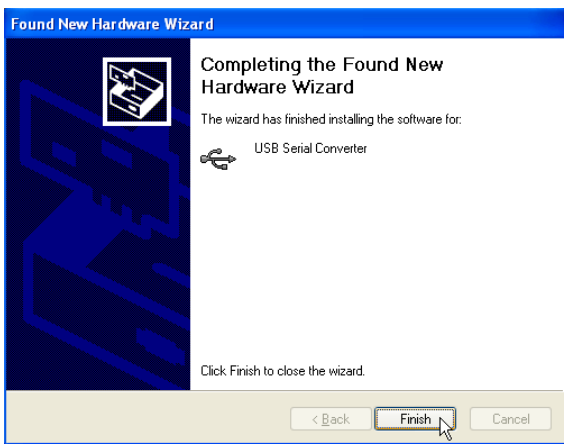
4) The Hardware Wizard installs the driver.

If Windows advises that the software is not certified, click: “Continue Anyway”. This only means that Microsoft has not certified the software. Second party software is allowed and no harm will come to your computer.



5) The first half of the installation is complete.

Click *Finish*.



6) A second driver might be required. In this case, the hardware wizard repeats the same process. As before; a: do not let the Windows search the software, b: tell Windows to search from a list or specific location instead of automatically installing software, c: tell Windows to search removable media (CD-ROM).

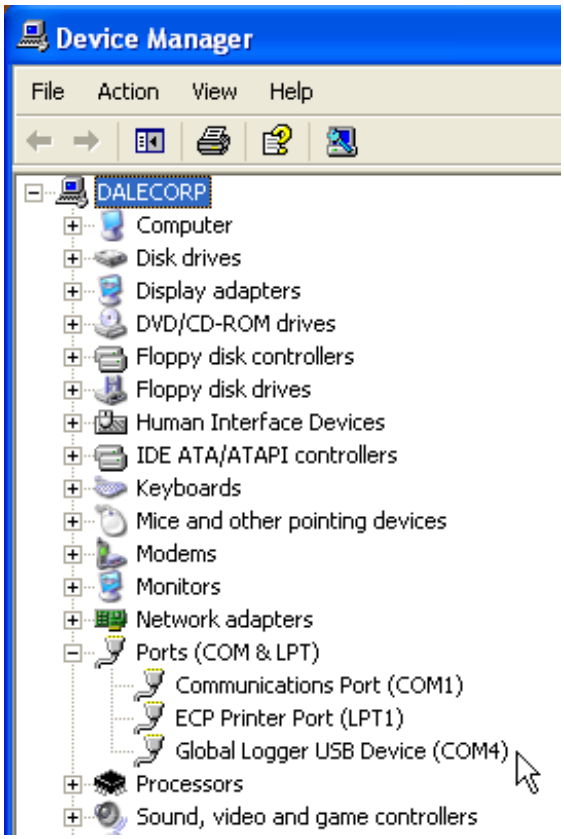
7) The installation is complete.

Click *Finish*.



8)) To confirm the installation, look in the Device Manager and find the USB Serial Port named "Global Logger USB Device (COMx)".

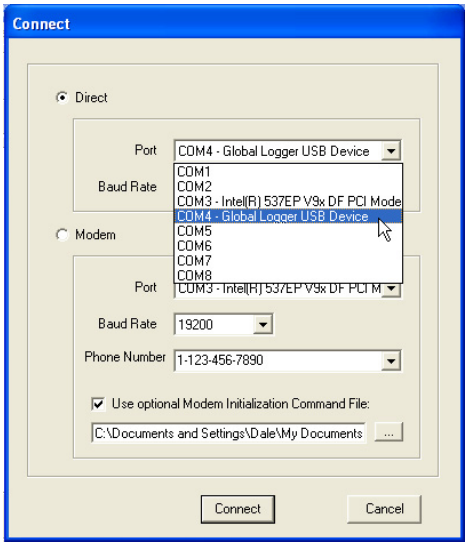
COMx is the virtual COM port that was automatically assigned to the driver. As you will see in the following sections, this COM port will be automatically detected by the Global Logger software. Thus it is not necessary to note which port is being used by the driver.

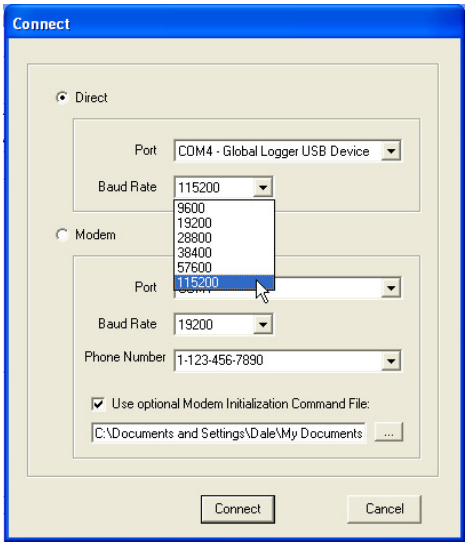


4 Direct connection

Important: The baud rate of the data logger is set to automatic recognition in the factory (Auto Baud Rate, see section 7.1). This setting should not be changed.

To make a USB connection to the logger, click the *Direct* option. As a port, select the USB connection, “COMx - Global Logger USB Device”.



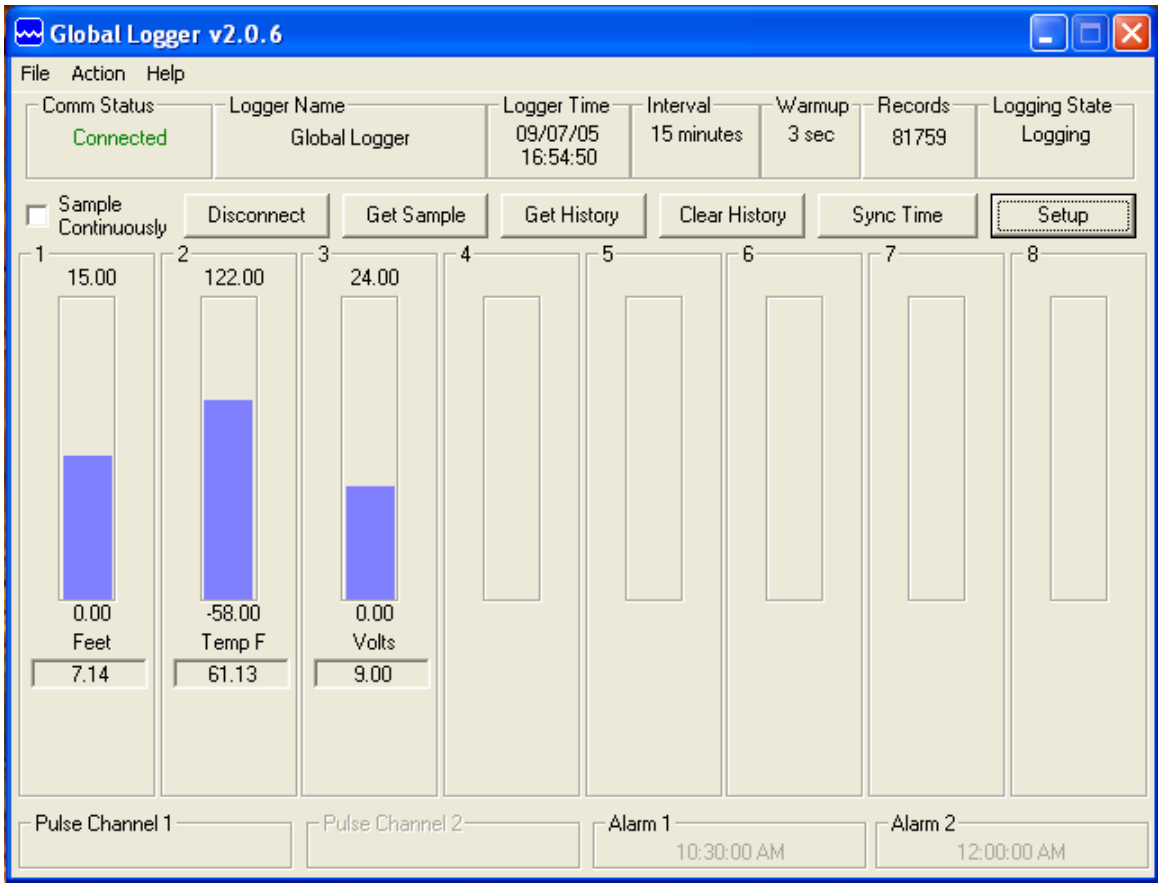


Set the baud rate to the highest value (115200).

Click the *Connect* button to make the connection. If a connection is not made, an error message will appear. Check the battery, connection cable, driver installation and COM port settings.

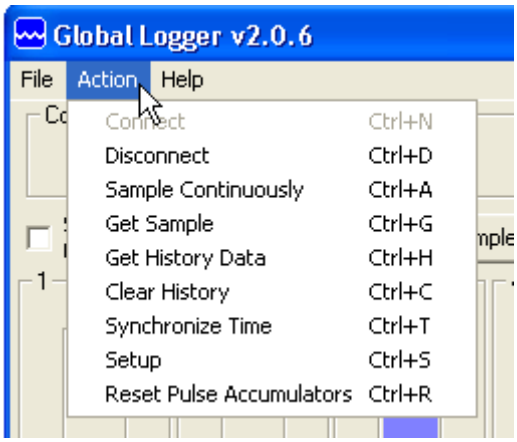
5 Main screen

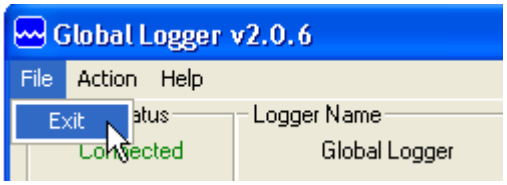
The main screen is where the status and option menus are accessed. The WLL Data Logger will continue to log at the set intervals while connected to the Global Logger software. While connected, the logger will draw an additional current from the power supply (5-10 mA); therefore, we recommend to disconnect the logger from the PC if you plan to not access the logger for extended periods of time to increase battery life.
The connection cable may remain connected. To disconnect, click on the “Disconnect” button. The label on this button will change to “Connect”; clicking on it will return you to the connection screen as previously discussed, and the logger will be connected again.

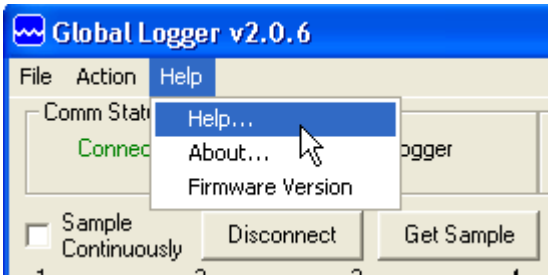


The functions and information in this screen are discussed in the following sections. Note that the second channel is optional and generally used for the water temperature option of the water level sensor. The figure above shows water level and temperature although any type of sensor can be connected to the WLL logger. Battery voltage is always monitored on channel 3.

Menu bar: The menu bar at the top of the screen has 3 options; File, Action and Help. In this screen, the File menu is used to exit the program only. The *Action* menu allows different actions. In the *Help* menu, you can call up the online help.







Connection status: This reads “Connected” in green or “Not Connected” in red, depending on the current connection status.

Logger name: The logger name is a user defined name associated with a particular logger to identify one from another. It is limited to 32 characters. It is assigned in the Setup menu as described later.

Logger time: The time and date displayed is that of the real-time clock in the logger. It is only updated upon initial connection and certain functions that cause data to be read from the logger. These include *Sample Continuously, Get Sample, Sync Time and Setup*; these functions are to be described later.

Interval: This field displays the logging mode. If the logger is in the normal fixed interval sampling mode, the time between samples will be displayed. These modes are to be described later. The other modes are *Fast* and *Logarithmic*.

Warmup: This field displays the sensor warm-up time.

Records: This field indicates the number of data recordings in memory.

Logging state: This shows whether the WLL Data Logger is currently logging or waiting to be started or stopped by the alarm timers. These features are described in detail later.

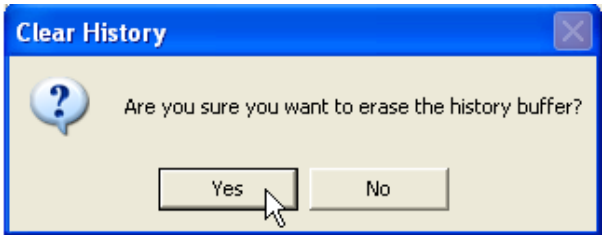
Sample continuously: Clicking this check box causes the Global Logger software to take and display a real-time reading once per second until stopped by clicking it again. At the same time, the rest of the fields on the screen are updated. These data readings are not stored in the historical record and do not affect the normal recording of the logger. The initial reading has a sensor warm-up time of 50 ms, and the sensor is left powered up until this feature is turned off.

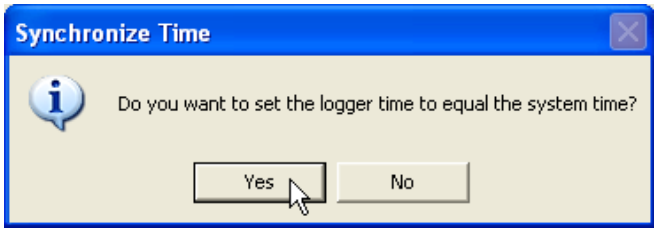
Get sample: Clicking this button causes the Global Logger software to take and display a single reading. At the same time, the rest of the fields on the screen are updated. This data reading is not stored in the historical record and does not affect the normal recording of the logger. The sensor warm-up time is fixed at 50 ms.

Get history: This button starts the download of all the historical data stored in the logger memory. Oldest data is collected first, and Clicking “Stop” halts the process. This function is described in detail later.

Clear history: This resets the number of recordings in memory to zero. The user is warned first and must confirm the action before the memory is cleared:

Sync Time: This button causes the data logger's internal clock to be set to the system time of the computer it is connected to. The user is warned first and must confirm the action before the time is set:





Setup: Clicking this button enters the setup menu where the user can change and program all settings of the data logger. This function is described in detail later.

Bar Graphs: The bar graphs show a visual representation of the most recent data reading taken by using the *Sample Continuously* or *Get Sample* functions. The upper and lower limits of the display are defined by the use; these features are described in detail later.

Numerical Reading: The numerical reading in the box below the bar graph shows the actual data reading and is updated at the same time as the bar graph. Up to 5 successive numerical readings taken by using *Sample Continuously* or *Get Sample* are shown in a list below the bar.

Alarm 1: This field shows the time that the logger is set to start logging. The start alarm is a 24-hour timer which will initiate logging, when enabled, at the next occurrence of that time.

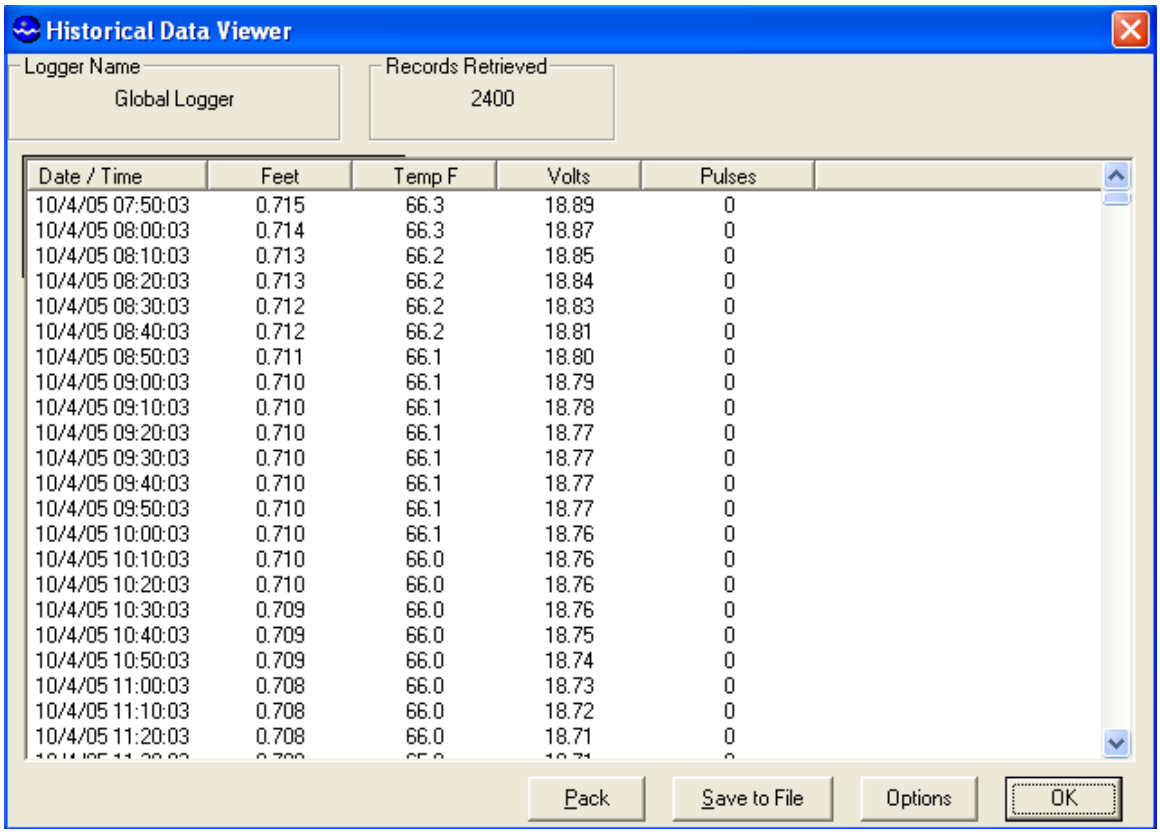
Alarm 2: This field shows the time that the logger is to stop logging. The stop alarm is a 24-hour timer which will halt logging, when enabled, at the next occurrence of that time after the logger has started recording. If the Alarm 1 timer is set to initiate logging, the Alarm 2 timer will halt logging at the next occurrence of the Alarm 2 time after the logger has been started by Alarm 1. If the Alarm 1 timer is not enabled, the Alarm 2 timer will halt the logger on the next occurrence of that time.

Note: The alarm start and stop cycle is a one time occurrence. Once stopped by the Alarm 2 timer, the logger will not resume logging again until the logger is reprogrammed. Reprogramming the logger with the timers enabled will restart the alarm cycle. Reprogramming the logger with the timers disabled will return the logger to a normal logging state

Use care when programming the alarm times. If left enabled, changing and reprogramming any of the setup parameters will restart the alarm timers and could thus cause the logger to stop recording.

6 Get History

Clicking the *Get History* button begins the downloading of the historical data into an information screen. This screen allows the viewing of the recorded data and also provides a path to export the data to an Excel compatible file (.CSV file). Note that the logger continues to log as data is downloaded. Thus, more data points may be downloaded than originally indicated.

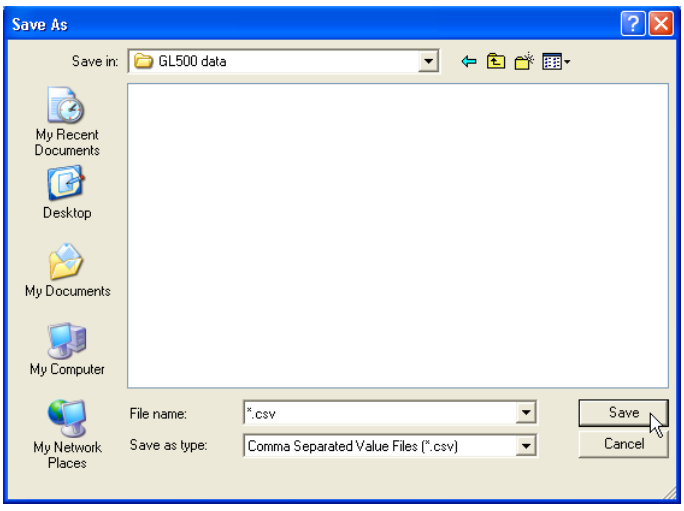


Date / Time	Feet	Temp F	Volts	Pulses
10/4/05 07:50:03	0.715	66.3	18.89	0
10/4/05 08:00:03	0.714	66.3	18.87	0
10/4/05 08:10:03	0.713	66.2	18.85	0
10/4/05 08:20:03	0.713	66.2	18.84	0
10/4/05 08:30:03	0.712	66.2	18.83	0
10/4/05 08:40:03	0.712	66.2	18.81	0
10/4/05 08:50:03	0.711	66.1	18.80	0
10/4/05 09:00:03	0.710	66.1	18.79	0
10/4/05 09:10:03	0.710	66.1	18.78	0
10/4/05 09:20:03	0.710	66.1	18.77	0
10/4/05 09:30:03	0.710	66.1	18.77	0
10/4/05 09:40:03	0.710	66.1	18.77	0
10/4/05 09:50:03	0.710	66.1	18.77	0
10/4/05 10:00:03	0.710	66.1	18.76	0
10/4/05 10:10:03	0.710	66.0	18.76	0
10/4/05 10:20:03	0.710	66.0	18.76	0
10/4/05 10:30:03	0.709	66.0	18.76	0
10/4/05 10:40:03	0.709	66.0	18.75	0
10/4/05 10:50:03	0.709	66.0	18.74	0
10/4/05 11:00:03	0.708	66.0	18.73	0
10/4/05 11:10:03	0.708	66.0	18.72	0
10/4/05 11:20:03	0.708	66.0	18.71	0

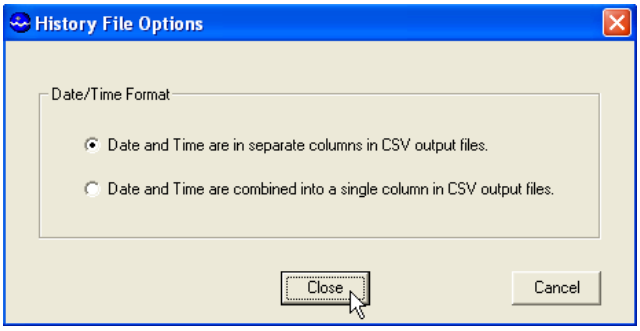
At the top of the screen is shown the name assigned to the logger and the number of recordings that have been retrieved. At the bottom of the screen are three buttons: *Pack*, *Save to File*, and *OK*.

Pack: The Pack function removes recordings that are identical to the previous ones. All the channels must be the same as the row above for it to be removed. If even a single channel has data that differs from the previous sample, the row will not be removed. This function works best when a single channel is being recorded and allows only the data showing changing conditions to be viewed.

Save to file: Clicking this button allows the data to be exported to an Excel compatible .CSV file. Specify the path and the file name and click the Save button.



Options: This opens a menu which allows you to select if you want the Time and date in the time stamp to be in one column or two in the saved .CSV file. Click *Close* to return to the information screen.



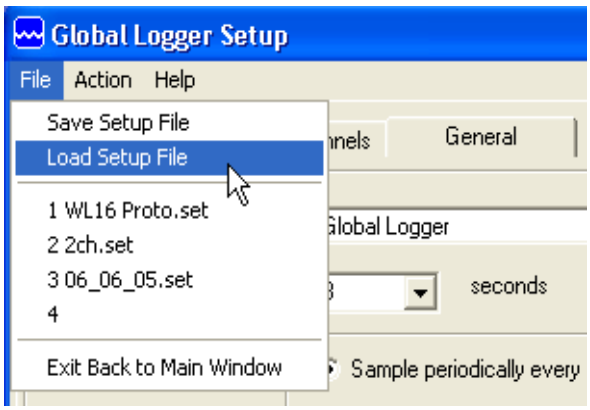
OK: This button exits back to the main window.

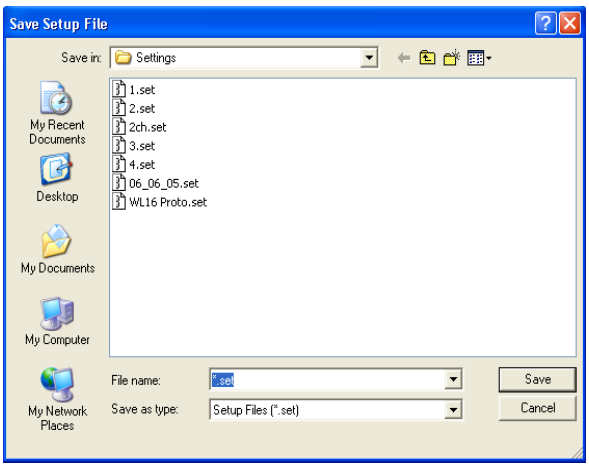
7 Setup menu

Clicking the Setup button enters the setup menu which is composed of three sections: *Analog, Digital* and *General*. The first screen to appear is *General Setup*. The menu bar appears at the top of the screen with the options, *File, Action* and *Help*.

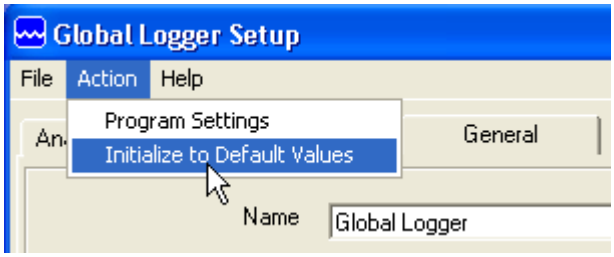
File: This menu allows you to exit the setup menu. Most importantly, however, it allows all of the configuration information for the logger to be saved to a file or restored from a file. Select “Load Setup File” to restore a configuration from a file that has been previously saved or “Save Setup File” to save the current setup and calibration information. The last 4 files are shown for convenience. Setup files have a *.set* extension.

It is advised that after you calibrate and configure the logger, you save the configuration to a file as a backup precaution before exiting the setup menu.





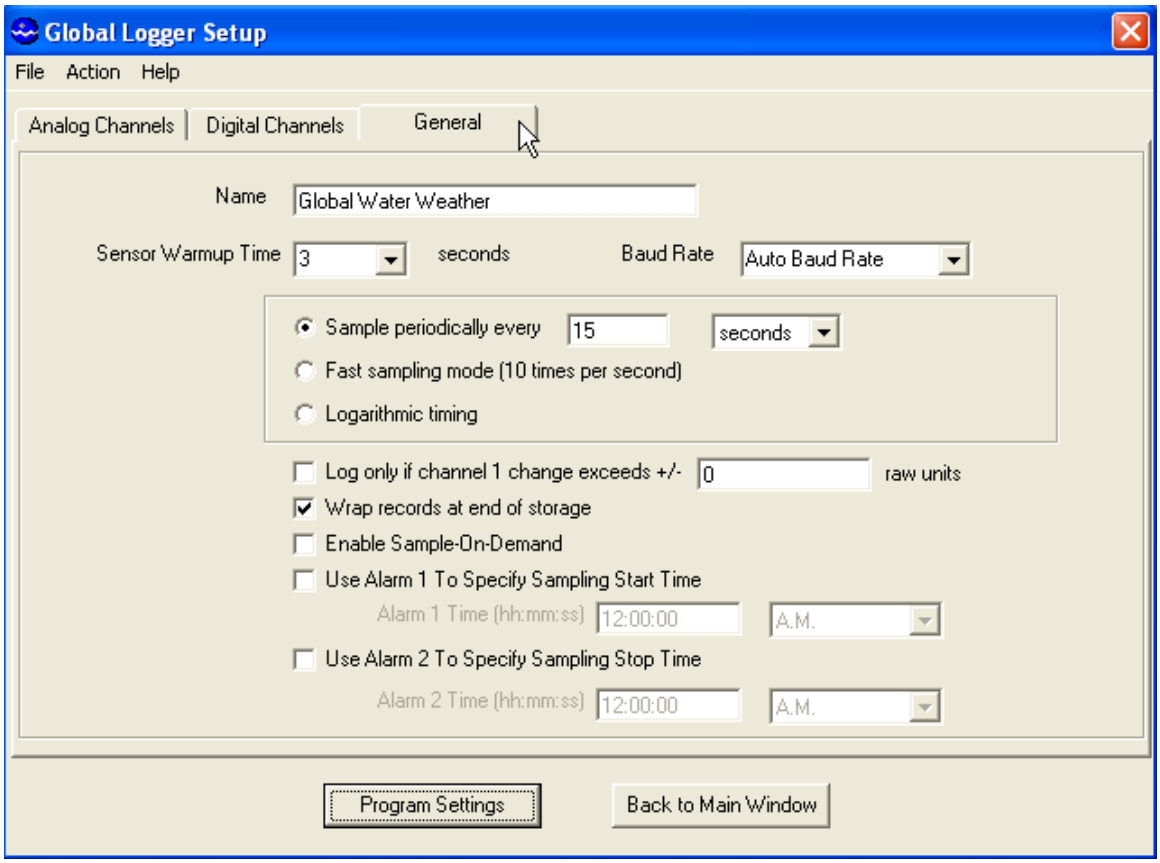
Action: This menu has two options: *Program Settings* and *Initialize to Default Values*. *Program settings* will reprogram the data logger with all the setup and calibration information. This option works the same as the *Program Settings* button at the bottom of the screen. *Initialize to Default Values* will restore all of the analog, digital and general setup information fields to default values. Only the values in the setup menus are changed, the data logger must still be programmed with the new default values. A warning message will appear before this action is taken.



Help: The Help menu provides access to the on-line help files.

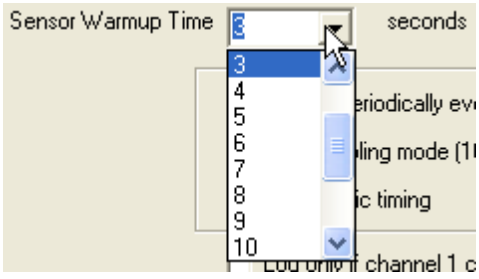
7.1 General setup menu

In the *General Setup* menu, the logger name, sensor warm-up time, logging mode, logging interval and alarm times are entered.

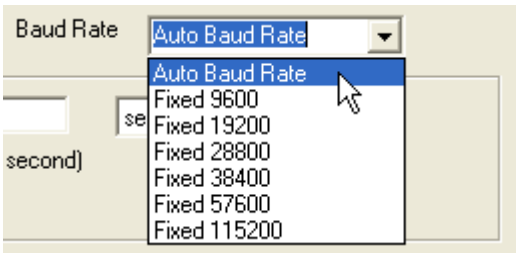


Name: You can give the logger a user definable name to identify the logger. Up to 32 characters are allowed however, a continuous string of characters of more than 16 with no spaces may not be displayed correctly. Click on the field to enter information.

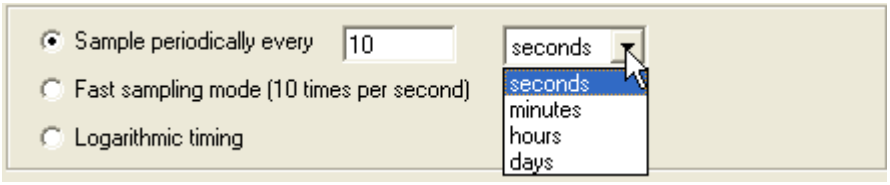
Sensor Warmup Time: To conserve battery life, the sensors do not normally have power applied to them. Before taking a reading, the logger powers up the sensors for the sensor warm-up time, and then removes power from them again. The allowable times are zero (50 ms) to 60 s. Click on the field to enter or select the time in seconds from the pull-down menu.



Baud Rate: Leave this set to Auto Baud Rate.
Once programmed in a fixed rate mode, you must set the Baud rate in the opening connection menu of the Global Logger II software (see section 4) to this speed, or the logger will not communicate.



Sample periodically every: Sampling at regular intervals is the most common recording mode. Click the *Sample Periodically* option, select the units from the pull-down menu and click the numerical field to enter the number of those units.

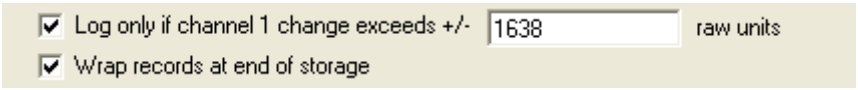


Fast sampling mode (10 times per second): In Fast sampling mode, the sample rate is fixed at 10 times per second. The time stamp will not read fractions of a second so there will be 10 samples per time stamp. Click the *Fast mode (10 times per second)* option to select this function .

Logarithmic timing: Typically used in groundwater pump studies. This mode changes the sample rate over time. Click the "Logarithmic timing" option to select this mode. This is a logarithmic approximation that steps up the sample rate:

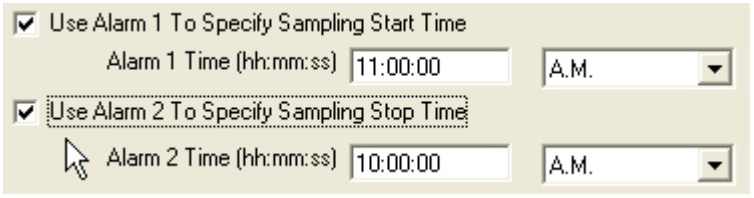
a. 10 times per second for 20 seconds, 200 samples
b. 1 second interval for 100 seconds, 100 samples
c. 10 second interval for 10 minutes, 60 samples
d. 1 minute interval for 60 minutes, 60 samples
e. 10 minute interval for 10 hours, 60 samples
f. 1 hour interval for 48 hours, 48 samples
g. 1 day interval until memory s full

Log Upon Deviation: Clicking this option causes the logger to record the current reading in memory only if it exceeds the previous reading by the preset amount entered in the numeric field. This only applies to channel 1; the deviation is measured in Raw Data units where the approximate raw data range is from 0-65535, corresponding to 0-20mA.



To find the actual number of raw data units per engineering unit, use the calibration numbers in the Analog Setup screen for channel 1 as follows: Raw Data Units per Engineering Unit = (High Raw – Low Raw) / (High EU – Low EU). Example: Assume a 15 ft water level sensor has a High EU of 15, a Low EU of zero, a High Raw of 62256 and a Low Raw of 13104. (62256-13104) / (15-0) = 3277 units/ft. Thus, if you want to log only when a reading exceeds the previous on by 0.5 ft, set the deviation to about 1638. Click the numeric field to enter the desired range.

Wrap records: If the "Wrap records at End of Storage" box is checked, once the memory is full, the oldest data points will be replaced with the newest. Thus, the memory block represents only the newest. If this feature is not checked, the logger will halt recording once the memory is full.



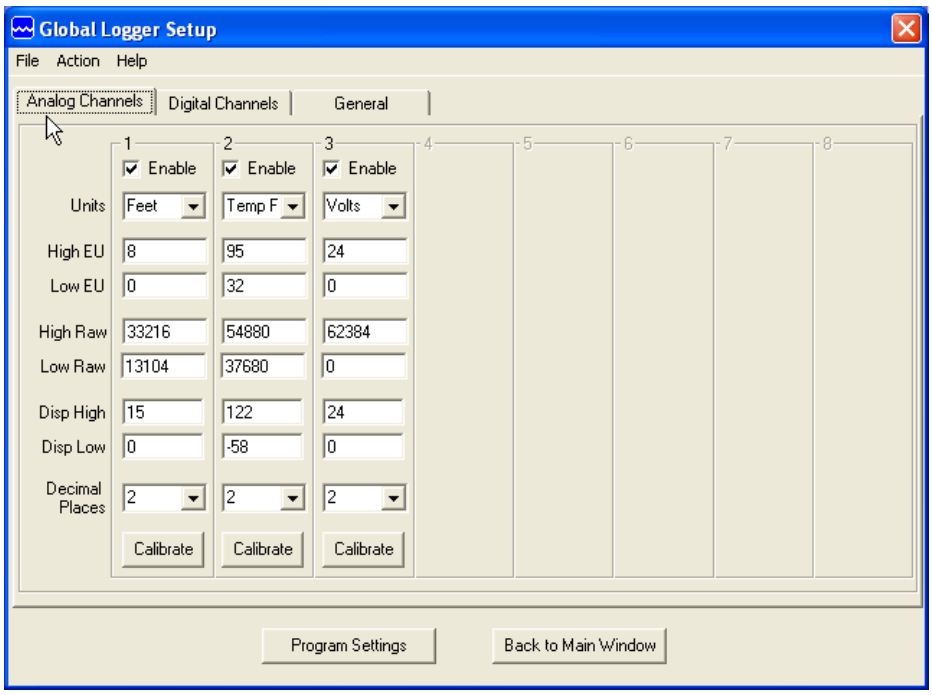
Use Alarm 1/2 To Specify Sampling Start/Stop Time: Check the box associated with each alarm to enable that feature and enter the desired start or stop time. The logger will start at the next occurrence of the Alarm 1 time and stop at the next occurrence of the Alarm 2 time after the Alarm 1 timer has expired. Either or both alarms can be enabled

Note: Use care when programming the alarm times. If left enabled, changing and reprogramming any of the setup parameters will restart the alarm timers and could cause the logger to stop recording and the loss of important data.

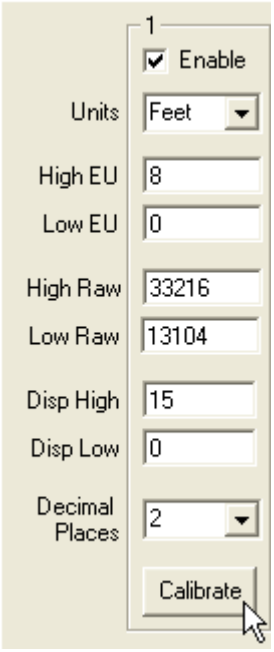
7.2 Analog setup

The Analog Setup screen sets the engineering units and calibration numbers for each of the analog channels, the end points of the bar graphs in the main screen, and which of the analog channels are enabled. These channels are calibrated in the same way so a single channel will be discussed.

It is important to note here that the information stored in the data logger's memory is just the sensor's output level before it is adjusted by the following calibration parameters. These parameters are used to adjust the stored data for display and storage purposes only, at the time the data is downloaded. If they are changed, the same stored data can be downloaded again and the data will be scaled differently according to the new settings.



The calibration of channel one to a water level sensor is discussed in the following example. In this case, it is not possible to calibrate the sensor over its full range. The water level sensor has a measuring range of 0 ... 15 ft but a water column of 15 ft may not be available.Therefore, the water level sensor will be calibrated in a range of 0 ... 8 ft, even when it is desirable to measure beyond these limits.



Enable: If the "Enable" box at the top of a column is checked, data for that channel will be shown in the historical record and be available for export to Excel. The data for all the analog channels is always being recorded whether the channel is enabled or not.

Units: In this field, the unit is selected that will appear at the top of the data column for that channel in the historical record as well as the display of data in the main screen. Click on the field to enter the unit or select from a predefined list.

High EU: The High EU field is the engineering unit where the highest output from the sensor is achieved during the calibration process, in this case a water level of 8 ft.

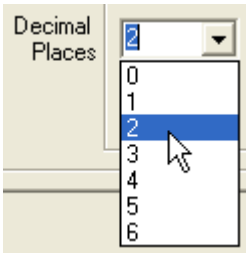
Low EU: The Low EU field is the engineering unit where the lowest output from the sensor is achieved during the calibration process, in this case a water level of 0.

High raw: This is the raw data value as measured by the WLL Data Logger that corresponds to the High EU value. It is automatically set by the calibration process. In this case, the raw data value returned by the logger at a water level of 8 ft.

Low raw: This is the raw data value as measured by the WLL Data Logger that corresponds to the *Low EU* value. It is automatically set by the calibration process. In this case, the raw data value returned by a water level of zero.

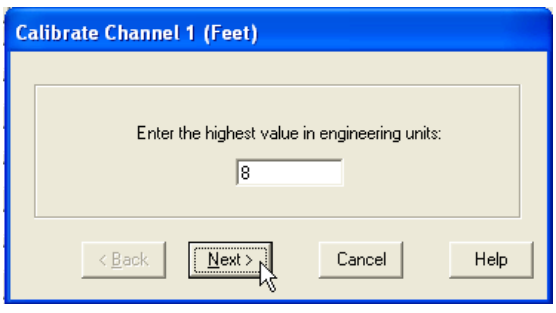
Disp High: This field sets the upper limit of the bar graph displayed in the main screen and provides a way of scaling the graph beyond the upper limit used to calibrate the logger. In this example, the upper calibration point was a water level of 8 ft but the maximum range of the sensor is 16 ft.

Disp Low: This field sets the lower limit of the bar graph displayed in the main screen and provides a way of scaling the graph beyond the lower limit used to calibrate the logger. In this example, the lower calibration point was a level of zero.



Decimal Places: From the pull-down menu, select the number of decimal places to the right of the decimal point that should appear in the historical data and in the numerical data field at the bottom of the bar graph.

Calibrate: The "Calibrate" button provides a simple 4-step process for calibrating the WLL Data Logger to a particular sensor. Click the *Calibrate* button and follow the menu instructions.

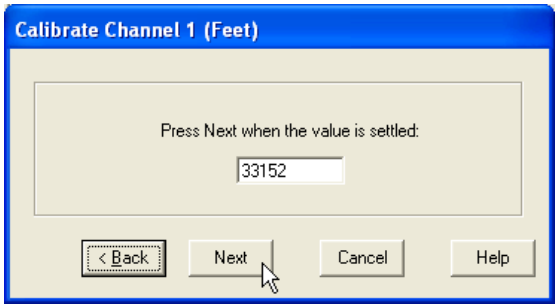


Click on the *High EU* field and enter the high engineering unit that will be used to calibrate the logger, *not the highest reading the sensor can output*. In this example of water level, a depth of 8 ft used to calibrate the logger, even though the sensor can measure up to 15 ft.

Click *Next*.

Place the sensor in the condition that will cause it to output the level corresponding to the High EU entered in the previous menu. Wait for the data reading to stabilize.

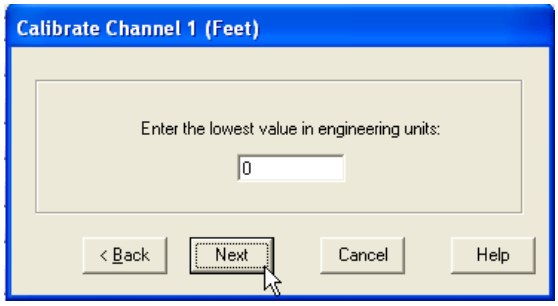
Then, click *Next*.



Click on the Low EU field and enter the low engineering unit that will be used to calibrate the logger. This is not necessarily the lowest reading the sensor can output.

In this example, the value is zero ft, which is the lowest calibration point and water level.

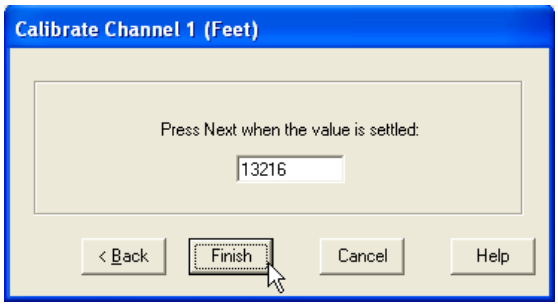
Then, click *Next*.



Place the sensor in the condition that will cause it to output the level corresponding to the Low EU entered in the previous menu.

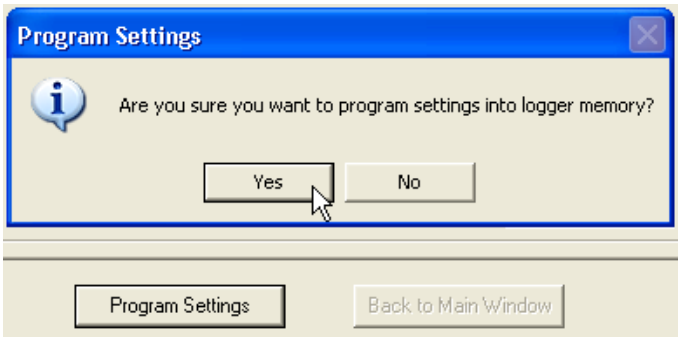
Wait for the data reading to stabilize.

Click *Finish* to complete the calibration procedure.

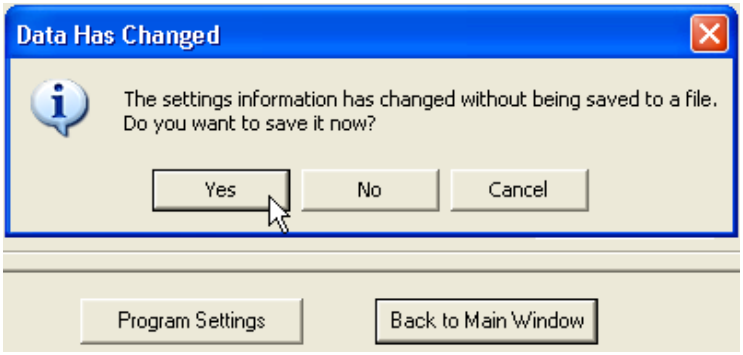


8 Programming

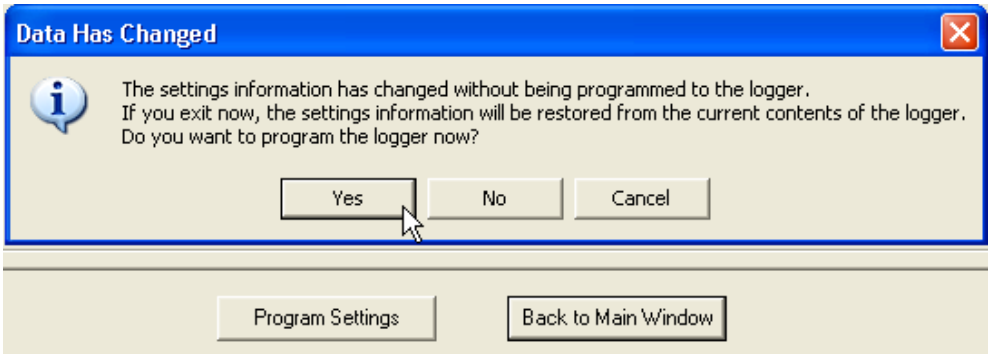
Program settings: The Program settings button at the bottom of the setup menus will cause all the setup and calibration information to be programmed into the data logger. A warning will appear requiring the user to confirm the action. Click *Yes* to program the logger or *No* to cancel the operation.



Back to Main Window: The Back to Main Menu button exits back to the main window. If no settings have changed, Exit will occur immediately. If settings have changed but not saved yet, a message will appear that asks the user if they would like to save them now. If the settings have changed but not yet programmed into the logger, another message will be shown asking if the logger should be reprogrammed.



These layers of protection are designed to prevent the user from unintentionally changing settings or forgetting to save the configuration file. Should the settings accidentally be changed, a saved configuration file can be loaded and used to restore the original settings.



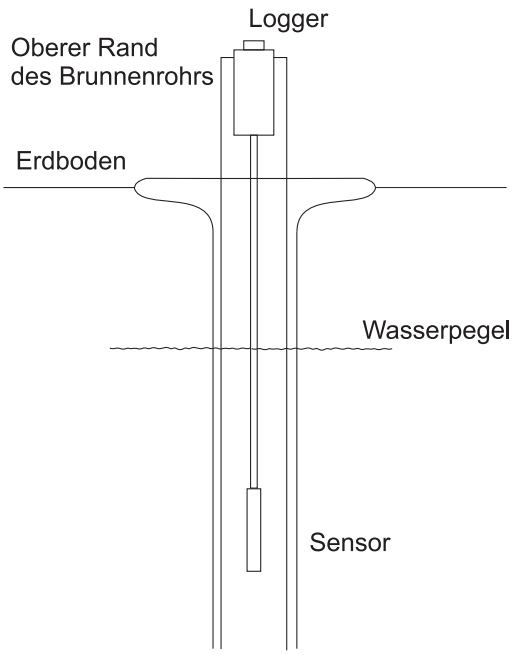
9 Adjusting the Zero Reference Level

The sensor on the WLL Data Logger measures the depth of water from the end of the sensor to the surface. However, it is sometimes desirable to know the water depth from a reference level other than the surface. Example: In a ground water well, you may want to know the distance from the surface of the water to ground level, not to the sensor.

The WLL Data Logger comes factory calibrated to measure depth from sensor to surface. Setting the reference level to something other than the water surface is easily accomplished by manually changing the Low EU and High EU numbers in the Analog Setup menu. If done correctly, this does not change the calibration of the sensor but rather, just changes the scale of the data to read in any desired range. ***Just one rule must be followed: The difference between the High EU and Low EU numbers bust be equal to the depth at which the sensor was calibrated.***

Example: If you have a sensor with a range of 0-30 ft, the logger has been factory calibrated at a range of 30 ft. The High and Low EU numbers can be changed to read any range without changing the accuracy, as long as the difference between them remains 30 ft. If you need to recalibrate the WLL Data Logger but do not have a 9 ft depth of water available, you can recalibrate at 6 ft (or whatever is available to you) as long as the difference between the High and Low EU numbers is equal to the calibration depth (in this case: 6 m).

If you wish to record the depth from sensor to water surface, the Low EU number is always zero. The High EU number is always equal to the depth at which the sensor was calibrated. Selecting a reference level other than the water surface is illustrated in the following examples.



Example 1:
Recording the distance from the top of the well pipe to water level:
Changing the zero reference to the top of the well pipe requires that you know the distance from the top of the pipe to the end of the sensor at the time of installation. Note that the cable length provided with the WLL Data Logger is not exact and should not be used as a standard without first measuring it.
To change the High and Low EU fields, and thus the recorded level, follow these steps:



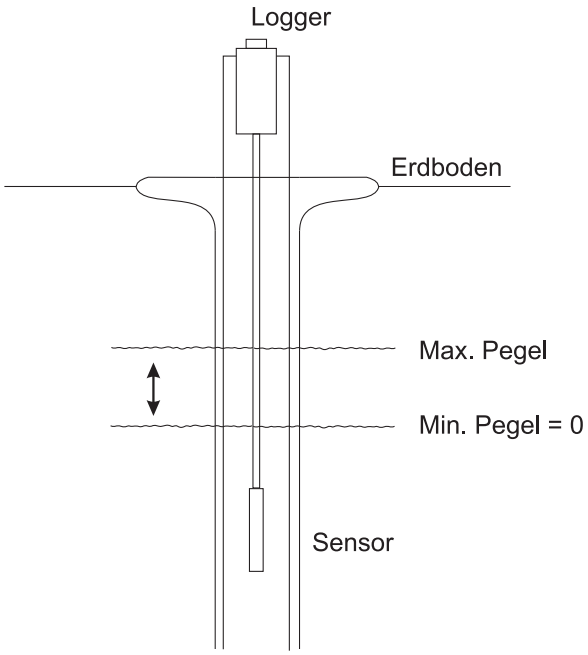
Caution
When installing the sensor, immerse it in the water carefully. If the sensor is thrown into the water, the membrane can be damaged.

- Install the WLL Data Logger as it will be in the final installation.
- Place a mark on the cable or logger housing at the point where it meets the top of the well pipe (or other desired reference level).
- Remove the WLL Data Logger and measure the distance from the tip of the sensor to the mark made in the previous step.
- Enter this length in the Low EU field in the Setup menu.
- Using the depth used to calibrate the sensor and the Low EU number from the previous step, subtract the smaller number from the larger one.

- Enter this new number in the High EU field.
- Reprogram the data logger according to the programming procedure.
- Reinstall the WLL Data Logger the same as before.

Assume that a sensor with a 30 ft maximum range is installed at a depth of 40 ft from the top of the well pipe and that the Low and High Raw data numbers were set at a 25 ft depth. The sensor is installed, a mark is made on the cable where it meets the top of the well pipe, and then removed. The cable is measured at 40 ft from the mark to the tip of the sensor, and 40 is entered in the Low EU field. Since the High Raw data number was set at the calibration depth of 25 ft, 25 is subtracted from 40; the result of 15 is entered in the High EU field.

Example 2:
Recording the relative change in water level:
If it is not important to know the exact distance from the water surface to the sensor or ground level, but only how much the level rises and falls over time, you may want to set a zero reference point equal to the minimum water level (or some other reference point).



Note: The data stored in the logger's memory is not affected by changing the High and Low EU numbers.
The data can be downloaded and analyzed, then the EU fields can be changed to re-scale the data during the next download process to set any desired reference level. This process can be repeated over and over without changing the logger's memory. This allows you to restore the data to its original calibration.

Assume that you wish to set the zero reference point to the lowest water level in the data record. This will show this low level as zero and all others as a positive level above it.

- Download the historical data and find the lowest water level in the record.
- Enter the setup menu and note the difference between the Low and High EU numbers; this is always the depth at which the sensor was calibrated.
- Type the lowest water level from the data record into the Low EU field.
- Add this number to the calibration depth and enter it into the High EU field.
- Reprogram the data logger according to the programming procedure.

Suppose you want to set the zero reference level to that of a specific event (date/time or a specific event such as a significant rainfall or a well pump turning on). Note that this will set a zero reference. Other levels are relative to this and can include negative numbers.

- Download the historical data and find the water level in the record for the reference date/time (or special event) you are interested in.
- Enter the setup menu and note the difference between the Low and High EU numbers; this is always the depth at which, the sensor was calibrated.
- Type the water level from the data record which corresponds to the specific date/time or event into the Low EU field.
- Add this number to the calibration depth and enter it into the High EU field.

- Reprogram the data logger according to the programming procedure.

Suppose you want to set the current water level as the zero reference.
If you want the current level to read zero you must only take a single reading and offset the Low and High EU numbers by that amount. Note that this will set a zero reference and that other levels are relative to this and can include negative numbers.

- Install the WLL Data Logger and take a reading.
- Enter this reading into the Low EU field as a negative number. If you measure 8.35 ft, enter –8.35 as the new Low EU.
- Add this number to the calibration depth and enter it into the High EU field.
- Reprogram the data logger according to the programming procedure.

10 Maintenance

1. Except for battery and desiccant, there are no user-serviceable parts inside the WLL Data Logger.
2. WTW recommends checking the batteries every 6 months.
3. Clean the sensor screen using clean water and a toothbrush to remove any algae, mud or sludge.

11 Error elimination

Issue: Logger is reading incorrectly.

1. Verify the battery supply has enough voltage. To operate properly, the logger and sensor must have a minimum of 8 volts. If the battery voltage monitor is reading less than 15 volts or seems incorrect, check the batteries with a voltmeter or replace them. Battery voltages of less than 15 volts indicate that the batteries need replacing.
2. Check the logger and sensor calibration numbers in the Setup Menu. Recalibrate the logger if necessary. As a precaution, save the setup file first as described in section 7.2 on page 19. Clean the sensor screen.

Issue: Cannot communicate with the logger.

1. Verify that good batteries are installed.
2. Check the communication cable.
3. Use the Device Manager to confirm that the USB driver is loaded and the correct virtual COM port is selected in the connection menu of the Global Logger software. Check the Device Manager in your operating system and confirm that the USB COM port is not being used by another device.
4. Try reducing the Baud rate in the connection screen of the Global Logger software.

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