



Global Water
Instrumentation, Inc.

WL15

Water Level Logger User's Guide



6/5/2002

Copyright © Global Water Instrumentation, Inc. 2002

Requirements

- Windows 95, 98, ME, NT, 2000 or XP*
- 486DX 66MHz, 16MB RAM (Windows 95 base machine; later operating systems may require higher specifications)
- Available COM port

Contact Information

Global Water Instrumentation, Inc.
11257 Coloma Road
Gold River, CA 95670

Toll Free: 1(800)876-1172
Local: 1(916)638-3429
Fax: 1(916)638-3270
E-mail: globalw@globalw.com
Web: www.globalw.com

Terminology

In order to better understand this product manual, please be aware of the following terminology and formatting usage.

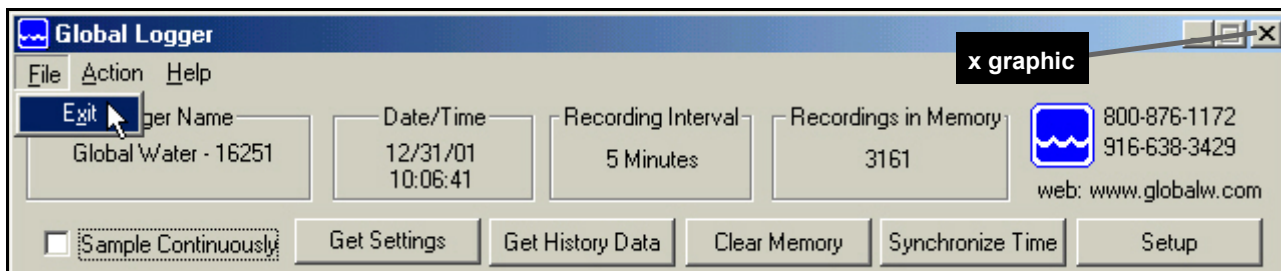
Bolded terms (i.e. **bold**) indicate either a keyboard key, a word or icon that appears on your computer monitor screen or a phrase to be emphasized. Context will dictate which is indicated.

Since it is assumed that users of this manual are familiar with mouse usage, many mouse operations are implied. The term “click” or “clicking” means to press and release the left mouse button. Similarly, “double-click” means to press and release the left mouse button twice in quick succession. For example, the phrase “Click the **start** button” should be interpreted as “Move the mouse pointer to the task bar and click the **start** button.” If any other mouse button is used in an operation, it will be specified in the documentation.

The term “select” means to move the mouse pointer over the indicated target. For example the phrase “Select **Toolbars** from the **View** menu” means to move the mouse pointer over **Toolbars** after the **View** menu has been displayed. “Select” is normally used when the mouseover action will cause additional menus to display.

The → symbol is used with submenu operations where the user should click the first and last items in the string separated by →. For example, the phrase “Click on **File** → **New** → **Folder**” means click on **File**, select **New** and click on **Folder**.

When the documentation directs you to exit a program or window, you can generally do so by clicking the **x** graphic in the upper right-hand corner or by clicking **File** → **Exit**.



*Windows® 95, 98, ME, NT, 2000 & XP are trademarks of the Microsoft Corporation

Table of Contents

CHAPTER 1: INTRODUCTION	5
THE WL15 WATER LEVEL LOGGER	5
FEATURES.....	5
CHECKLIST.....	6
GETTING TO KNOW THE WL15	7
CHAPTER 2: SETUP	9
INSTALLING THE WL15.....	9
SYSTEM TIME CHECK	9
GLOBAL LOGGER SOFTWARE INSTALLATION.....	10
HARDWARE INSTALLATION.....	14
General Installation Tips	14
Groundwater Installation.....	15
Surface Water Installation.....	15
Special Installations	16
STORING THE WL15.....	16
CHAPTER 3: USING GLOBAL LOGGER SOFTWARE	17
HARDWARE CONNECTION	17
GLOBAL LOGGER STARTUP.....	17
GLOBAL LOGGER FUNCTIONS.....	19
Sample Continuously/Real-Time Values	19
Get Settings.....	19
Get History Data	19
Clear Memory	21
Synchronize Time	22
Setup	22
Datalogger Name and Sensor Warmup Time.....	23
Calibration	24
Recording Interval and Memory Management.....	26
CHAPTER 4: MAINTENANCE	29
BATTERY.....	29
CALIBRATION	30
SENSOR SCREEN SCREENING.....	30
CHAPTER 5: TROUBLESHOOTING	31
COMM FAILURE	31
SENSOR READING INCORRECTLY	32
WATER IN THE VENT TUBE	32
OTHER ISSUES	32
CHAPTER 6: WARRANTY	34
APPENDIX A: WL15 DETAILED SPECIFICATIONS	35
DATALOGGER.....	35
SENSING ELEMENT.....	36
HOUSING.....	36
CABLE	36
APPENDIX B: WORKSHEETS.....	37
CALIBRATING THE BAR GRAPH TO HIGHER OR LOWER RANGE.....	37

CALIBRATING LEVEL SENSORS FOR DEPTH TO WATER READINGS..... 38
APPENDIX C: CABLE CONFIGURATION..... 39
APPENDIX D: TERMINAL PROGRAMMING..... 40
COMMUNICATION COMMANDS FOR WINDOWS DATALOGGER..... 40

Introduction

The WL15 Water Level Logger

Congratulations on your purchase of the Global Water WL15 Water Level Logger. This instrument has been quality tested and approved to provide accurate and reliable water level (water pressure) measurements. We are confident you will find the WL15 to be a valuable asset for your applications. Should you require assistance, our technical staff will be happy to help.

The WL15 provides a datalogger with a submersible pressure transducer for remote monitoring and recording of water level, flow or pressure data. This highly reliable and accurate water logger records 24,400 readings and is programmable from one reading per second to one reading per day. Ranges of 0-3', 0-15', 0-30', 0-60', 0-120' and 0-250' are available. A 25' cable is standard, and optional cable lengths are available up to 1000'.

The WL15's datalogger is housed in a weather-resistant cylindrical enclosure that slips inside a 2-inch pipe. The logger is easily adapted with standard hardware for well head mounting or other installations. The WL15 includes Windows-based software, allowing easy upload of data to standard spreadsheet programs on a PC computer.

The WL15's level sensor electronics are fully encapsulated with marine-grade epoxy, providing superior moisture protection over O-ring seals. During this process, the vent tube is sealed directly to the sensing element, preventing any moisture from damaging the sensor's electronic components.

The level sensor uses a unique silicon diaphragm to interface between the water and the sensing element. This silicon diaphragm is highly flexible and touches the sensing element, producing a sensor with exceptional linearity and very low hysteresis. The pressure transducer utilizes a stainless steel micro-screen cap to protect the sensing element. This protective cap has hundreds of openings, making fouling the sensor with silt, mud or sludge virtually impossible.

Features

Data

- Windows based Global Logger* software
- Tabular display/printout
- Data in standard spreadsheet format
- Communication cable included (RS232C)

Logger

- Weather resistant enclosure
- Fits inside 2" pipe
- Records 24,400 readings
- 12 bit or 1/4,000 resolution
- Battery powered

Cable

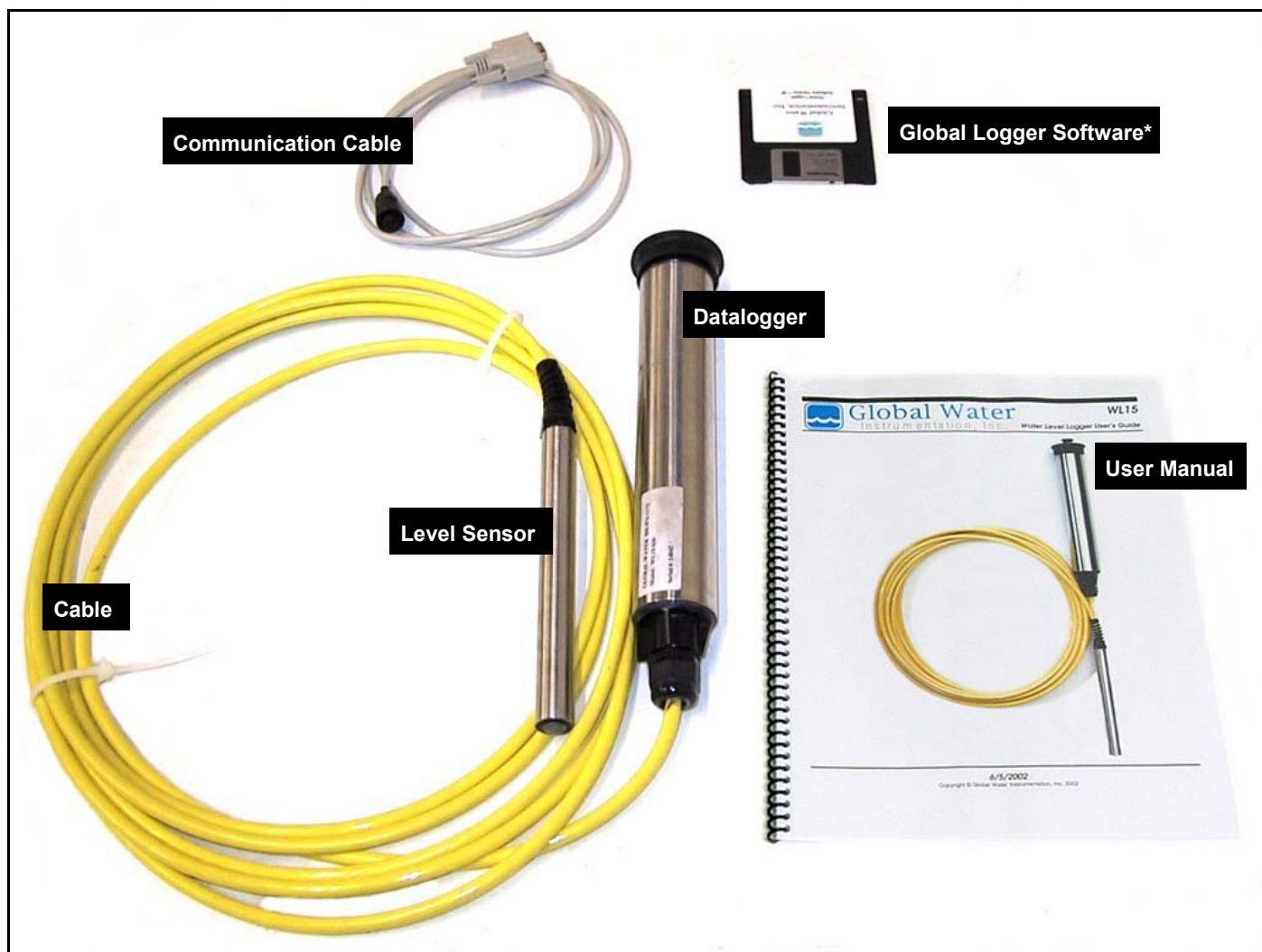
- Marine grade, heavy urethane jacket
- Barometric pressure vent
- Lengths up to 1000'

Sensor

- Fully encapsulated submersible pressure transducer
- Amplified and temperature compensated
- High accuracy
- 3/4" diameter wet-wet transducer (no vent moisture problems)

Checklist

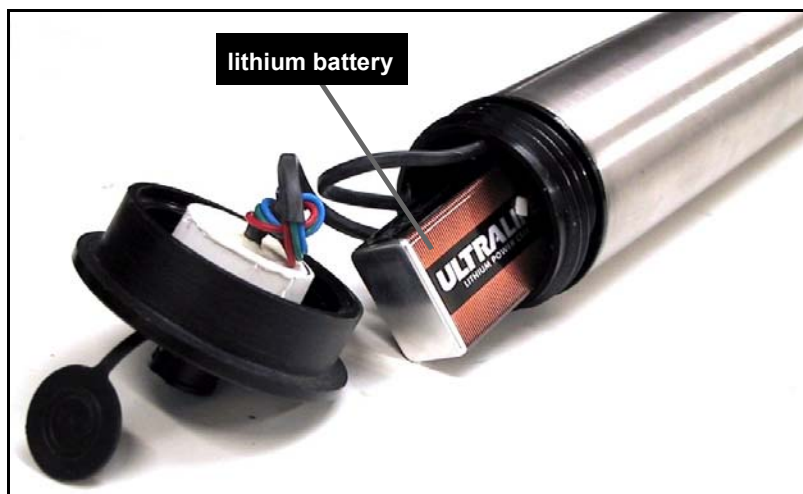
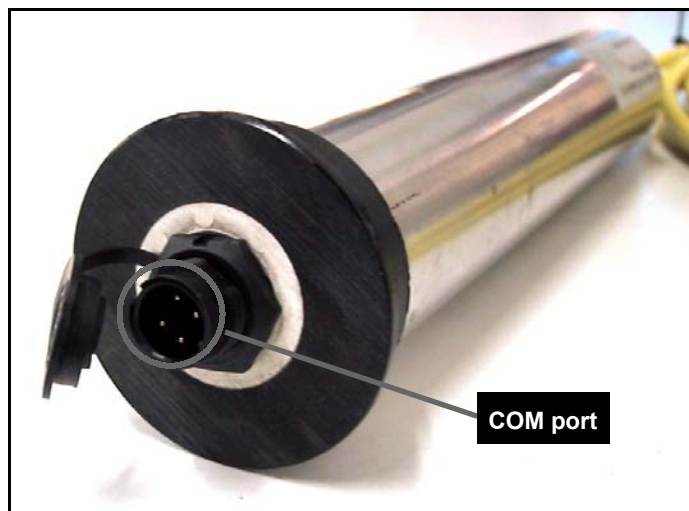
Your WL15 was carefully inspected and certified by our Quality Assurance Team before shipping. If any damage has occurred during shipping, please notify Global Water Instrumentation, Inc. and file a claim with the carrier involved. Use the checklist to ensure that you have received everything needed to operate the WL15. Your sensor has been inscribed with the sensor range for easy identification.



- WL15 (Datalogger, Level Sensor and Cable)
- User Manual
- Communication Cable (RS232C COM Cable)
- Global Logger Software (3 1/2" Floppy Diskette)

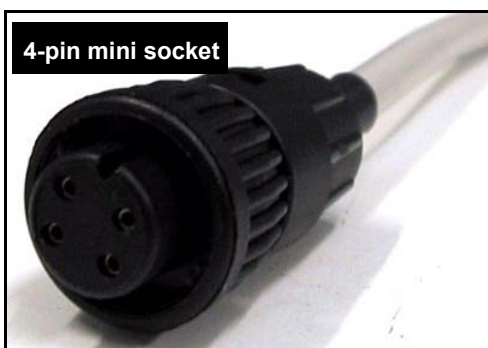
Getting to Know the WL15

The COM port can connect to a PC serial port using the included Communication Cable.



Unscrew logger cap to access lithium battery.

The Communication Cable has two different connectors. Connect the DB-9 female connector to your PC and the 4-pin mini socket* to your Datalogger.



*See Appendix C: Cable Configuration, page 39



The water level sensor is located inside the sensor housing, near the mesh screen.



Setup

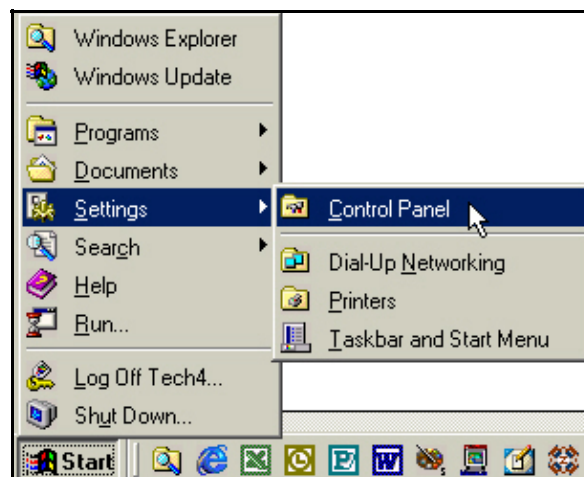
2

Installing the WL15

System Time Check

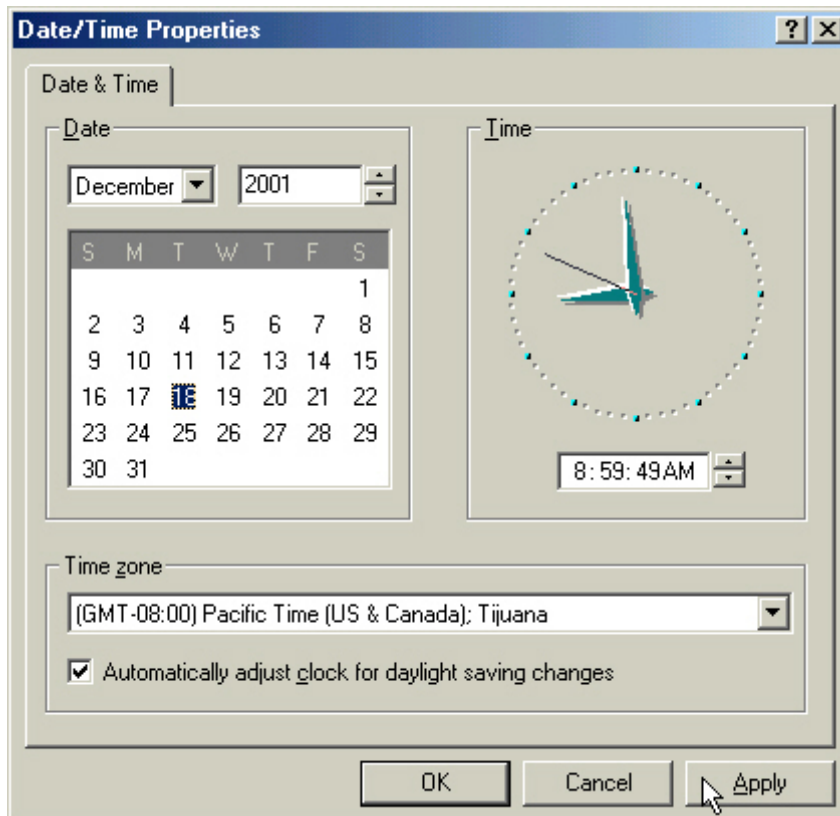
Before you install the software, check the accuracy of the time and date on your computer. The WL15 will be programmed with this information.

To verify your system time in Windows, click **Start** → **Settings** → **Control Panel** from the task bar.



Double-click the **Date/Time** icon.

Verify that your system is set to the correct time. If not, make the necessary changes and click the **Apply** button followed by the **OK** button. Exit the control panel.



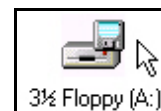
Global Logger Software Installation

Insert the 3 1/2" floppy diskette labeled "Global Logger Software Version x.xx" (where x.xx is a version number such as 1.36) into your computer's floppy disk drive. Normally, the floppy will be the computer's "A" drive.

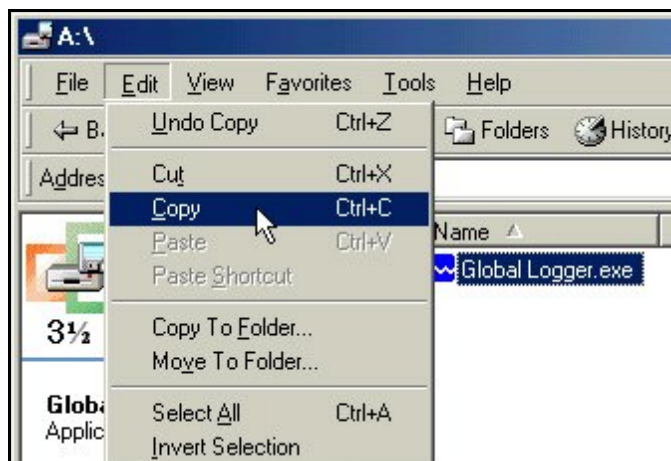
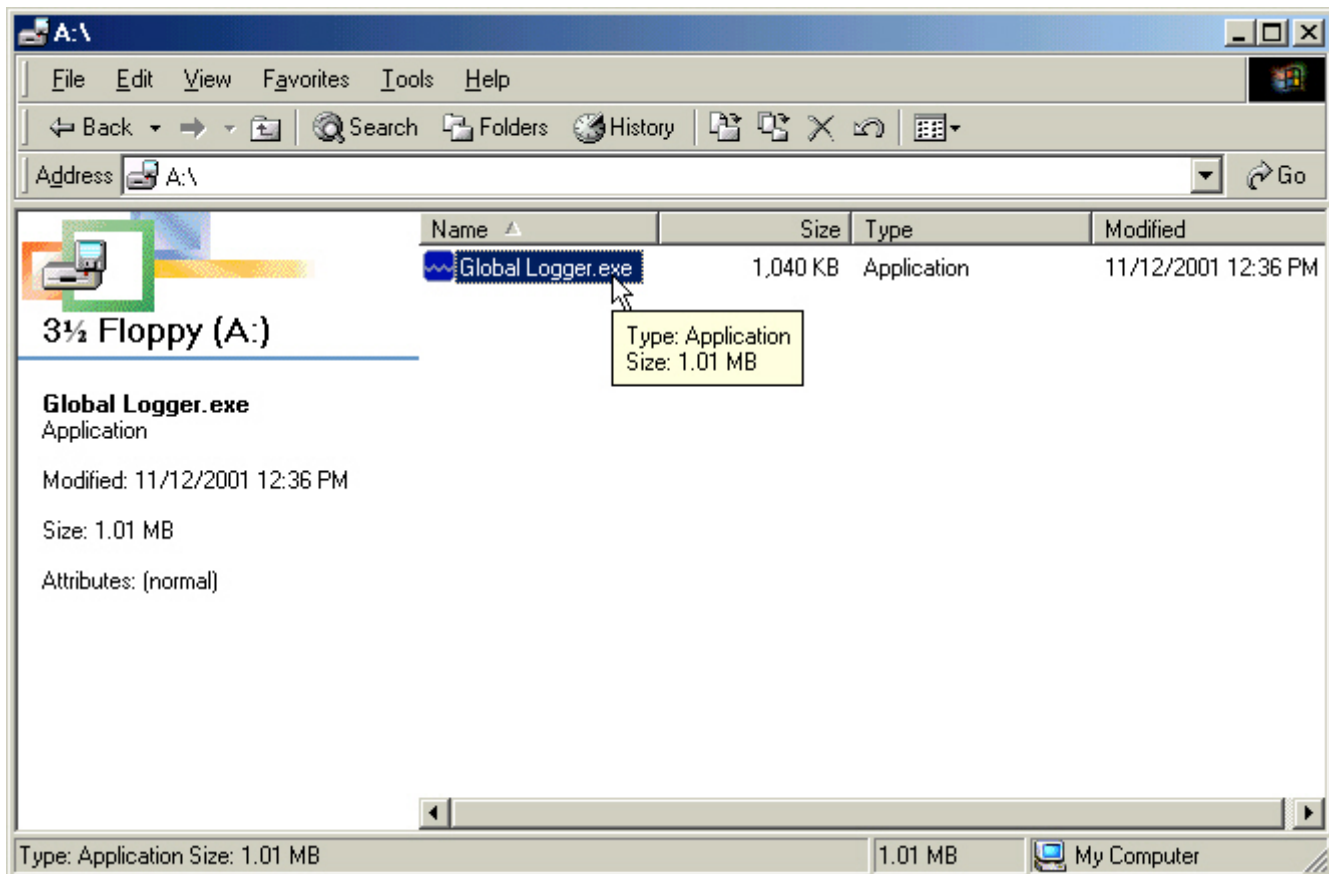


Double-click the **My Computer** icon on your desktop.

Double-click the floppy icon (normally listed as **3 1/2 floppy (A:)**).

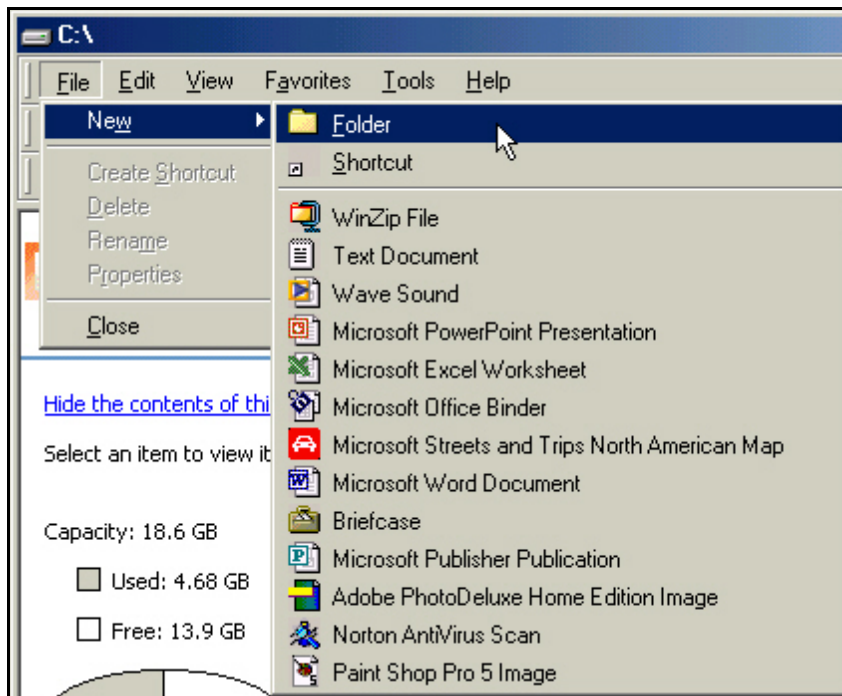
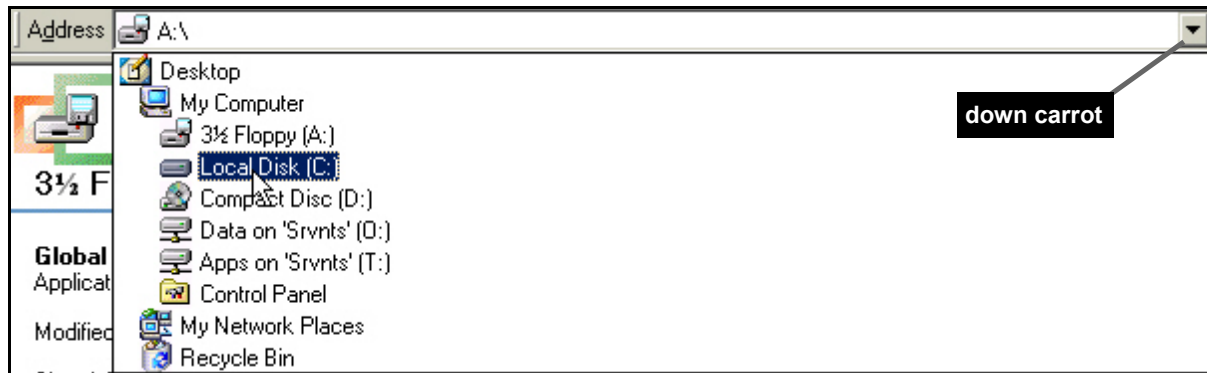


Click on the file **Global Logger.exe**.



Click **Edit** → **Copy** from the menu bar.

Save the file to a directory of your choosing. Note, it should be a location you will easily remember. To save to the directory **Global Logger** located on your main “C” hard drive (although “C” is normally the main system drive, the designation can vary from system to system), start by clicking the down carrot of the address field. Click on the **Local Disk (C:)** icon or appropriate main system drive designation.

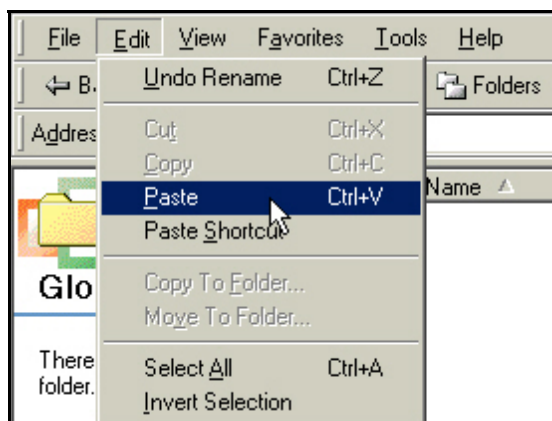
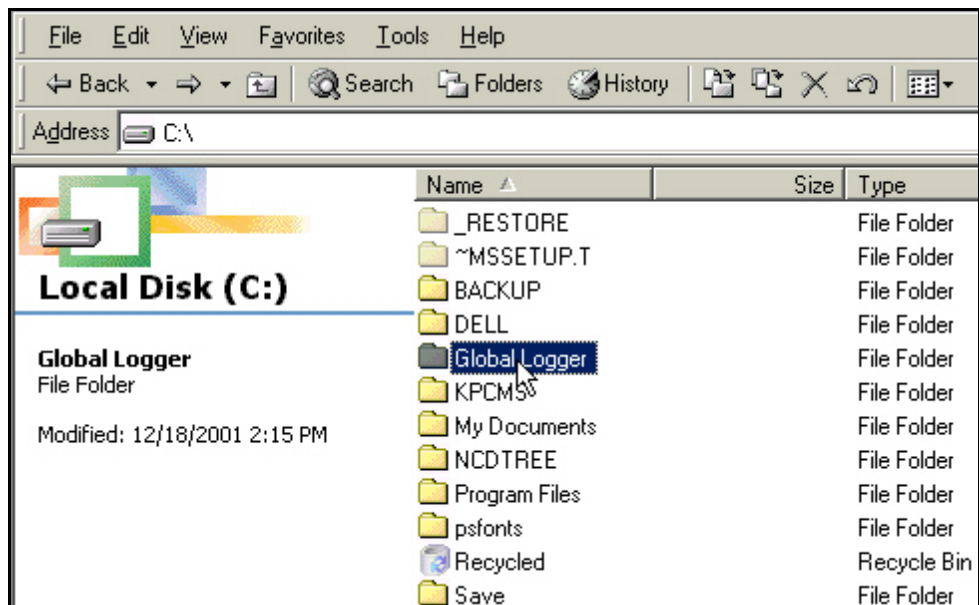


If the directory **Global Logger** is not listed, click **File** → **New** → **Folder** from the menu bar.

The directory **New Folder** should now be created and automatically selected for typeover. Type **Global Logger** and press the **enter** key.

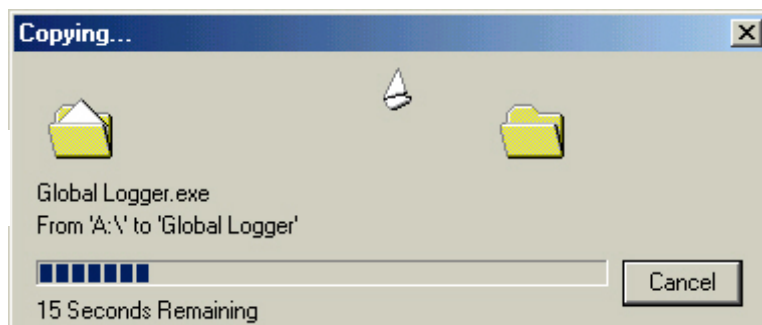


Double-click on the new **Global Logger** directory.

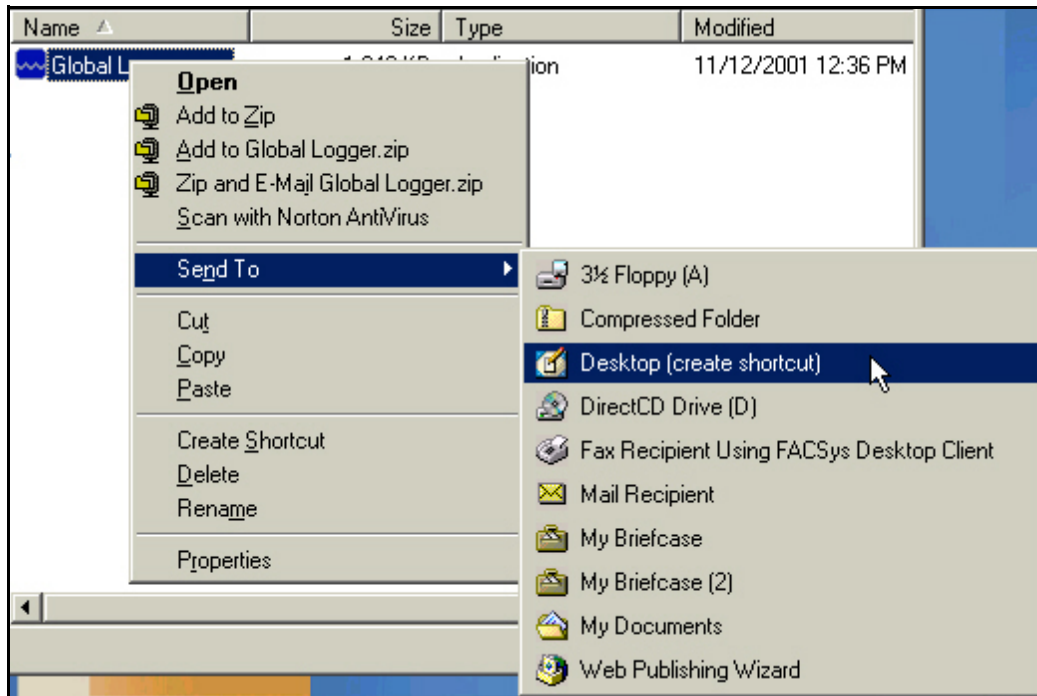


Click **Edit** → **Paste** from the menu bar.

A **Copying...** dialog box should now display. Wait for the copy process to complete.



To create a desktop shortcut, right-click the **Global Logger.exe** file you previously saved, select **Send To** and click on **Desktop (create shortcut)**.



You can now access your Global Logger* software directly from the desktop.

Hardware Installation

General Installation Tips

- The WL15 has many applications and therefore many installation options. The WL15's pressure sensor is fully submersible and may be suspended by its waterproof cables in the water to be monitored.
- **The data logger is not waterproof.** It is water-resistant. This means that condensation, which can build up inside the enclosure during humid conditions, should not affect the performance of the WL15. However, if the data logger is submerged in water, it will corrode the electronics and cause it to stop working properly. Please ensure that the data logger will be clear from flooding and out of direct rainfall.
- **Do not install the WL15 in applications that contain solvents.** Over time, many solvents can deteriorate the cable and the sensing element.
- The accuracy of the sensor readings can be affected by such adverse conditions as overpressure, lightning strikes, improper care/handling, and physical damage or abuse.

- The WL15's cable contains a vent tube that allows for barometric pressure compensation. **Do not allow the vent tube to become kinked or obstructed as this may cause erroneous readings.**
- Install your WL15 so that it is easily accessible for calibration purposes. You may need to remove and reinstall it in the future, so plan ahead!
- The pressure sensor will not function correctly if buried by mud, silt, leaves, or other debris. Install the sensor in a way that avoids these conditions.

Groundwater Installation

- For best results suspend the pressure sensor in a 2" monitoring well near the well screen. The sensor may be installed in well diameters 1" and up.
- For a 2" diameter pipe (or larger), the sensor can be inserted directly. Slowly lower the sensor into the well. Warning: **Do not allow the sensor to "freefall" down the well, this may cause damage to the sensor.** The top of the data logger will rest on the top of the well pipe. A slip cap or a locking well cap can conceal the WL15. The cable length of the WL15 should be sized so the sensor will be positioned below the lowest expected water level, which is not necessarily the bottom of the well. The correct cable length is measured from the top of the data logger to the bottom of the sensor. The sensor's measuring range should be slightly larger than the expected total amount of change in water level.
- To shorten the cable in a 2" diameter or larger well, coil it around a 1" diameter stick or pipe and secure the cable at both ends with tie wraps or tape. Warning: **Do not kink the cable; this may damage the internal vent tube.**
- The WL15 can be adapted to larger or smaller well casings by using standard PVC pipe reducers and fittings or Global Water's Inside Well Option.
- As factory programmed, the WL15 records depth of water above the sensor. If you want to use your WL15 to record depth to water readings, follow the worksheet **Calibrating Level Sensors for Depth to Water Readings***.

Surface Water Installation

- The sensor may be submerged at the monitoring point and hung from its cable. It is recommended to protect the sensor and datalogger inside a 4" PVC drainpipe that will act as a protective stilling well. PVC schedule 40, or ABS sewer drainpipe is recommended. PVC schedule 40 electrical conduit has UV protectors and pre-formed "sweeps" or bends that enable it to conform to the contours of a river-bank. The level sensor will slide down through 45° or 90° sweeps. The pipe may be buried in the river-bank, secured with rocks, or fastened to the bank with large staples made by bending pieces of concrete reinforcing steel in half and driving them into the bank. Put a cap on the bottom end of the pipe to allow easy water flow past the sensors. Drop the sensor until it touches the bottom of the stilling well and then pull it up slightly and secure the cable. The pipe should have several ½" diameter holes drilled near the sensor location in order to eliminate any velocity effects on the sensor. In addition, a smaller ¼" hole should be drilled near the top of the pipe to allow air movement when the water goes up and down. A standard slip cap or a locking well cap can be used to secure the WL15. The pipe can also be adapted for a screw-on cap.

*See Appendix B: Worksheets, page 38



- In areas where vandalism is prevalent, 4” diameter galvanized steel pipe may be used for any exposed pipe. Plastic pipe, adapted to the steel pipe above water, may be used for the underwater section. A screw-on galvanized cap can then be used to cover the data logger. Two small pipe wrenches are required to access the WL15, but this installation is essentially bulletproof and vandal-proof.

Special Installations

- For flumes and weirs Global Water provides the Weir Stick Water Level Logger. This logger/sensor combination can be mounted inside a 2” diameter pipe that acts as its own stilling well, or the Weir Stick can be mounted in an existing stilling well. The weir stick is 3’ overall in length with a 2’ measuring range.
- For measuring pressure in pipes, the level sensor may be purchased with a 3/4” NPT thread on the sensing end. The sensor threads can be adapted to existing ball valves with standard pipe fittings.
- The WL15 Sewer Pipe Flow Option includes a level sensor built into a protective “mouse” housing and attached to a 12” stainless steel strap. When the sensor/straps are installed at the invert of a sewer or in a pipe, the data logger can be attached to a sewer’s stair rungs. If there is enough slack in the cable, the data logger can be accessed from the manhole above the stair rungs.
- When installed in a pipe that is under 12” diameter, the steel straps spring into the pipe, holding the sensor in place. Additional fasteners are usually not required for this type of installation.
- For a sewer pipe over 12” diameter, the sensor’s steel straps must be mounted into the pipe. The straps can be secured with molly or concrete bolts, or with marine-grade epoxy.

Storing the WL15

The WL15 may be stored without any special provisions. Place the datalogger and sensor inside a bag to keep the instrument clean and store on a shelf or hang on a wall.

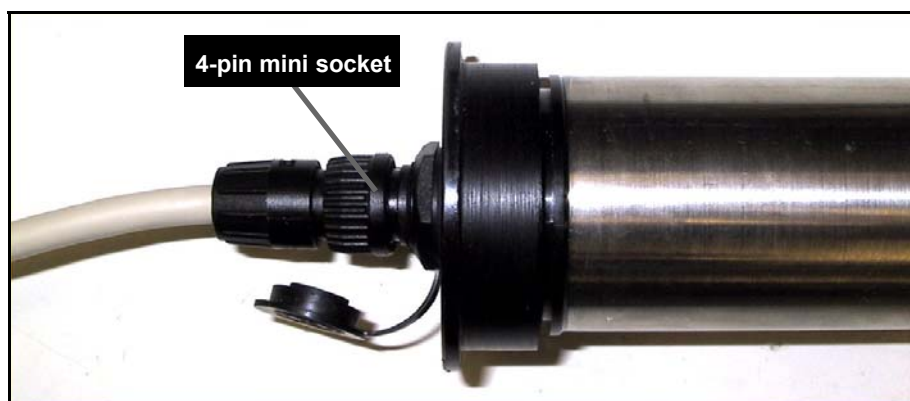
Using Global Logger Software

3

Hardware Connection

Connect the DB-9 female connector of the included communication cable (RS232C) to the COM 1 serial port on your computer. If COM 1 is being used, either disconnect and/or disable the device on COM 1 or connect to COM 2*.

Connect the 4-pin mini socket of the communication cable (RS232C) to your WL15 COM port.



Global Logger Startup



Double-click the Global Logger icon on your desktop if you created a desktop shortcut during software setup. Otherwise, access the directory in which your the **Global Logger.exe** file is stored and double-click on the file. If you have not installed the Global Logger software or if you want to create a desktop icon, see **Global Logger Software Installation****.

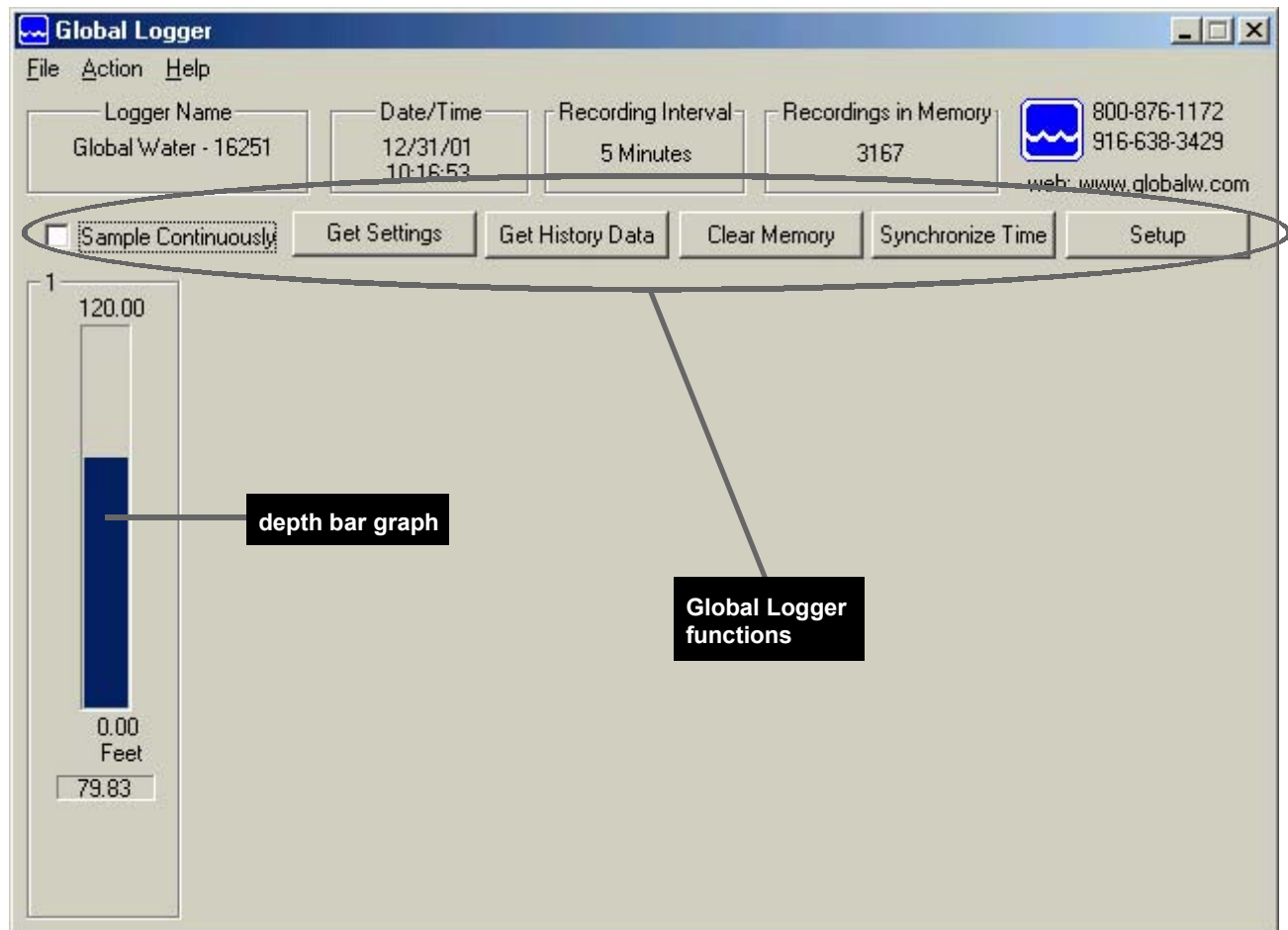
* See Comm Failure, page 32.

**See Global Logger Software Installation, pages 10 – 14

The Global Logger main window will display data in the following fields: **Logger Name**, **Date/Time**, **Recording Interval** and **Recordings in Memory**.

Access the Global Logger functions **Sample Continuously**, **Get Settings**, **Get History Data**, **Clear Memory**, **Synchronize Time** and **Setup** through the main menu check box and buttons. All Global Logger functions can also be accessed through **Action** on the menu bar.

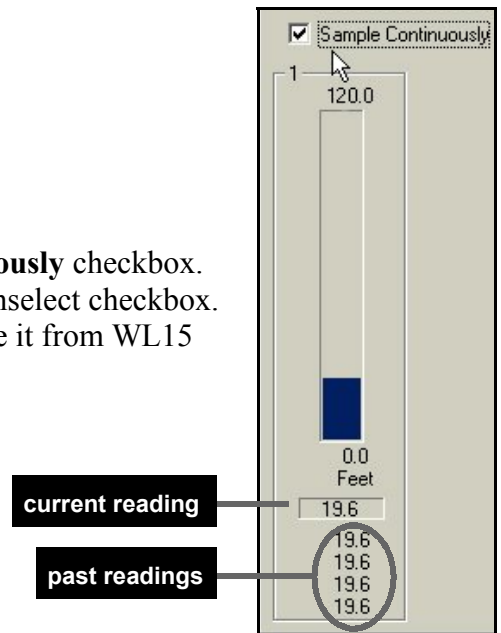
The bar graph on the left side of the screen indicates current depth of sensor. For example, the graph in the following screen shot displays a 120 foot sensor with a reading of 79.83 feet. This data indicates that the sensor is currently at a depth of 79.83 feet. Sensors are calibrated to a variety of unit specifications (i.e. meters), so your bar graph readings may differ slightly.



Global Logger Functions

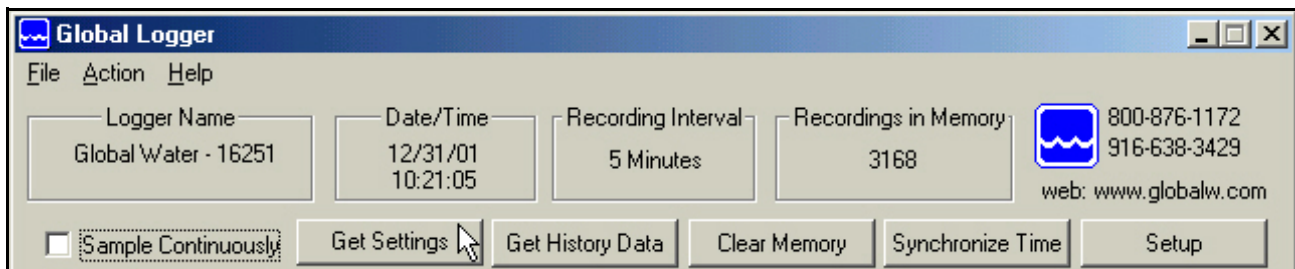
Sample Continuously/Real-Time Values

To display real-time values every second, select the **Sample Continuously** checkbox. Readings will display below the depth bar graph. To stop readings, unselect checkbox. Note, that real-time data is not recorded; therefore, you cannot retrieve it from WL15 memory.



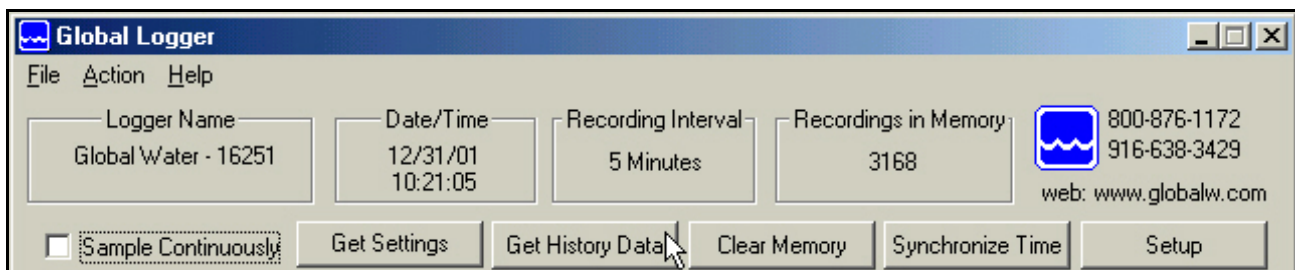
Get Settings

To refresh information in the Global Logger main window, click the **Get Settings** button. This action will update the **Logger Name**, **Date/Time**, **Recording Interval** and **Recordings in Memory** fields.



Get History Data

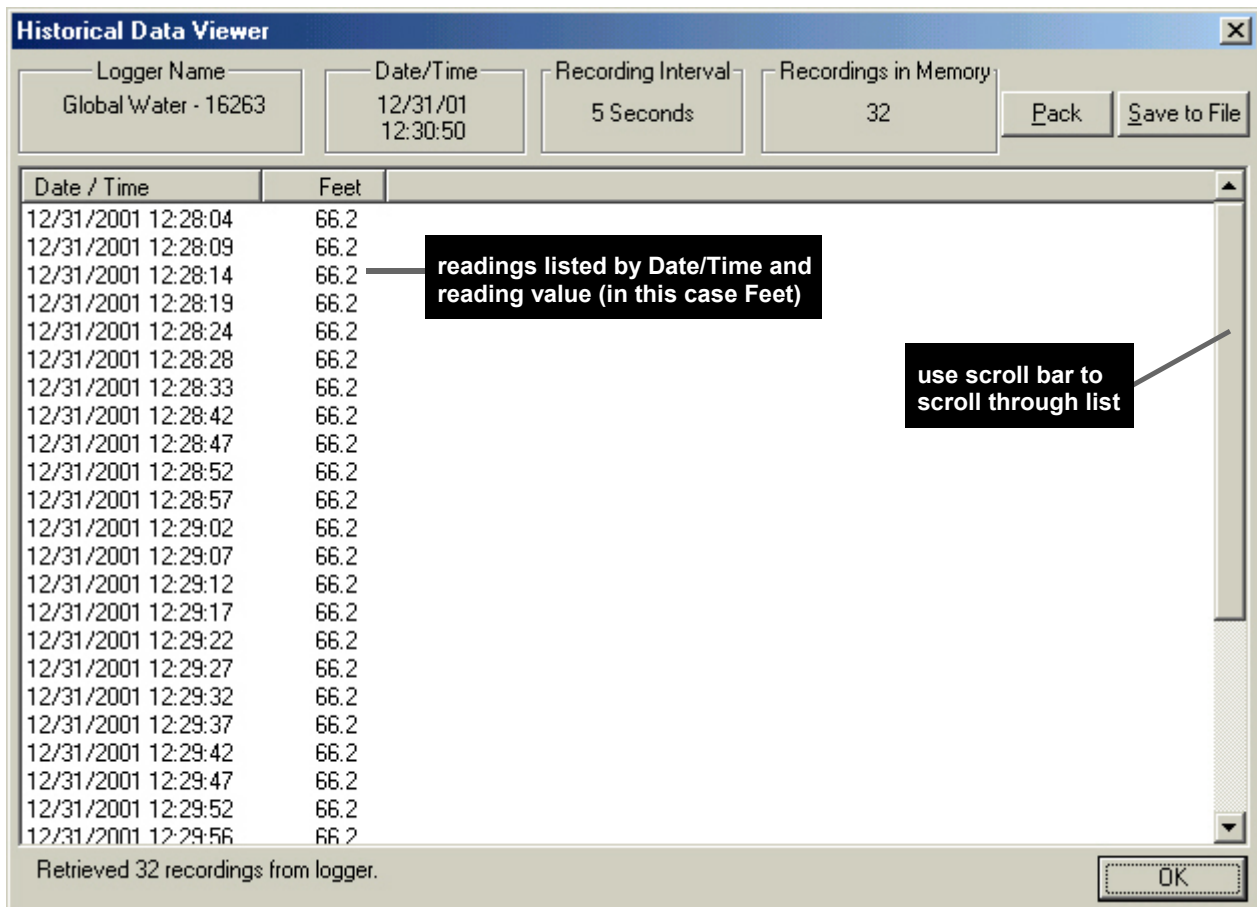
To retrieve logged data from memory, click the **Get History Data** button. The speed of your upload will depend on the number of data points recorded (more recordings equals longer upload time). To minimize long upload times, clear memory* after backing it up to disk**.



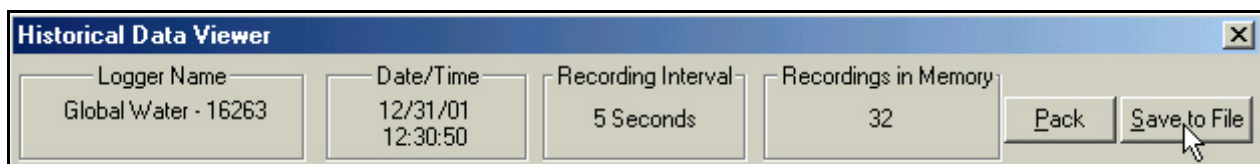
* See Clear Memory, pages 21 – 22

**See Get History Data, pages 20 – 21

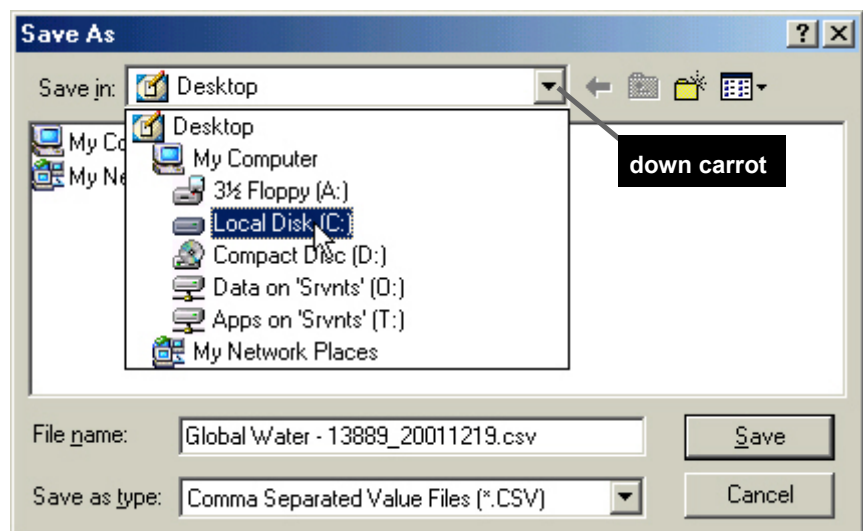
A **Historical Data Viewer** window will display. This window lists each data point by date/time and reading value. If there are more data points in memory than will fit in the data view window, use the scroll bar to scroll through the list of readings.



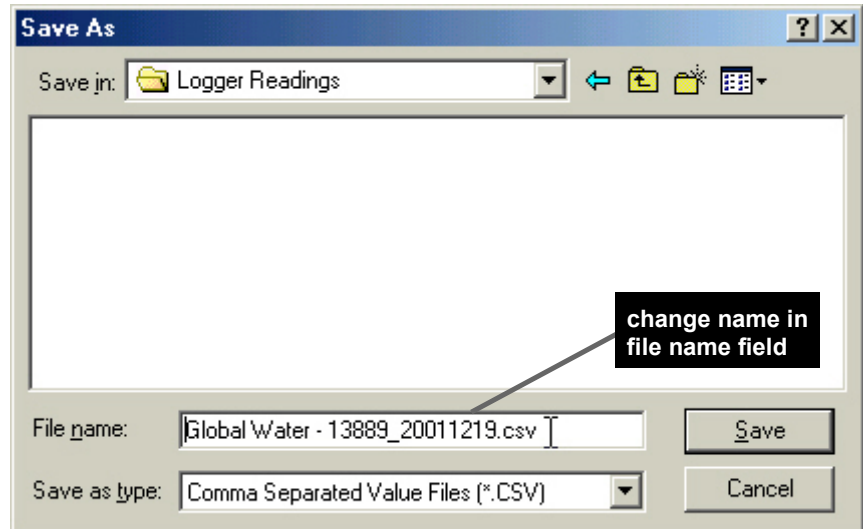
If you want to save current readings, click the **Save to File** button.



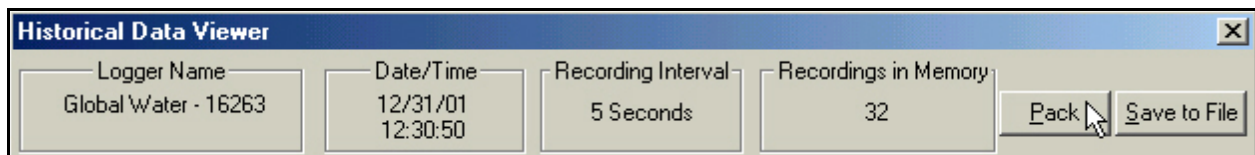
A **Save As** window will display. If you want to save your file to a directory other than the one displayed, click the down carrot of the **Save in:** field and click on the device (i.e. hard disk drive, floppy disk drive, etc.) you want to save the file to.



Double-click the directory or subdirectory you want to save to. If you want to change the file name click anywhere in the **File name:** field and type the desired name. However, do not change the .csv extension. This extension ensures the file will be recognized as a comma separated value (*.CSV) file. You can open CSV files in spreadsheet programs such as Microsoft Excel*. Click **Save** to save the file.



To remove zero readings, click the **Pack** button. Note, this operation will not remove the initial zero reading. Since the pack function does not change the readings stored in memory, you will need to **Save to File** to preserve the pack operation. If you exit and then reenter the **Historical Data Viewer** window, all readings (including zero readings) stored in memory will display regardless of any prior pack operation.

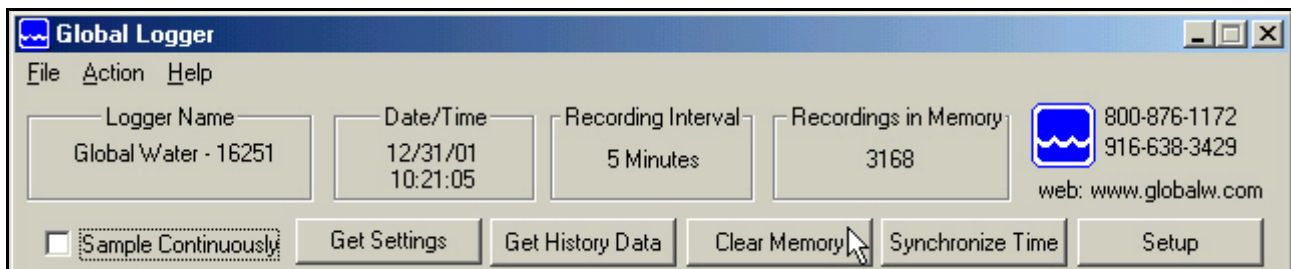


Click **OK** to exit the **Historical Data View** window.

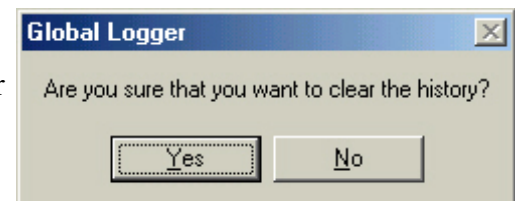


Clear Memory

To clear your WL15's memory of readings click the **Clear Memory** button.



A confirmation dialog box will display. Click **Yes** to clear history or **No** to keep readings.



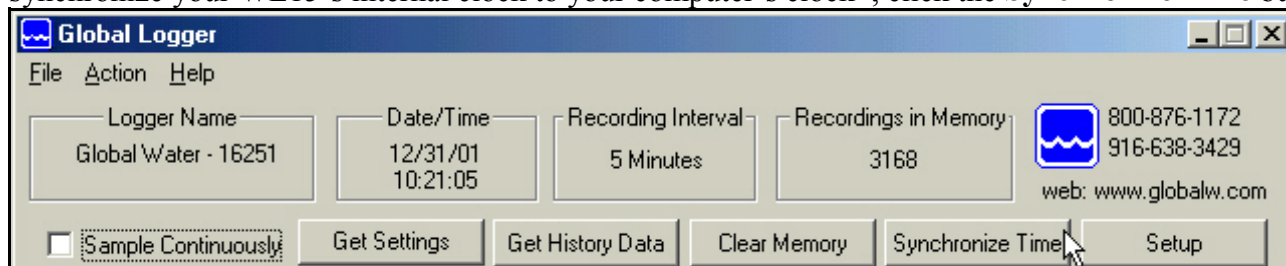
*Windows® Excel is a trademark of the Microsoft Corporation

If you click **Yes**, a **Standby** graphic will display in the middle of your monitor screen while the memory is purged.

Standby

Synchronize Time

To synchronize your WL15's internal clock to your computer's clock*, click the **Synchronize Time** button.



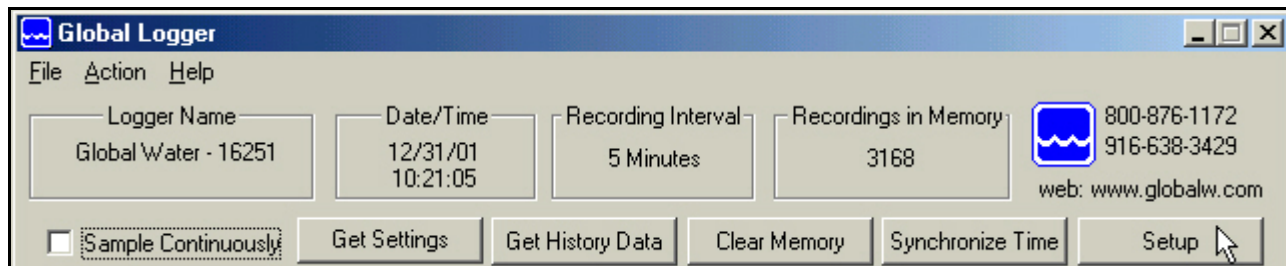
A **Standby** graphic will display in the middle of your monitor screen while synchronizing.

Standby

Setup

Note that your Water Level Logger has come completely setup from our factory. It has been calibrated and tested for optimal accuracy and performance. If you choose to recalibrate your sensor, use the following procedures.

To begin calibration and/or to change time interval settings, click the **Setup** button. A **Global Water Setup** window will display.



*See System Time Check, pages 9 – 10

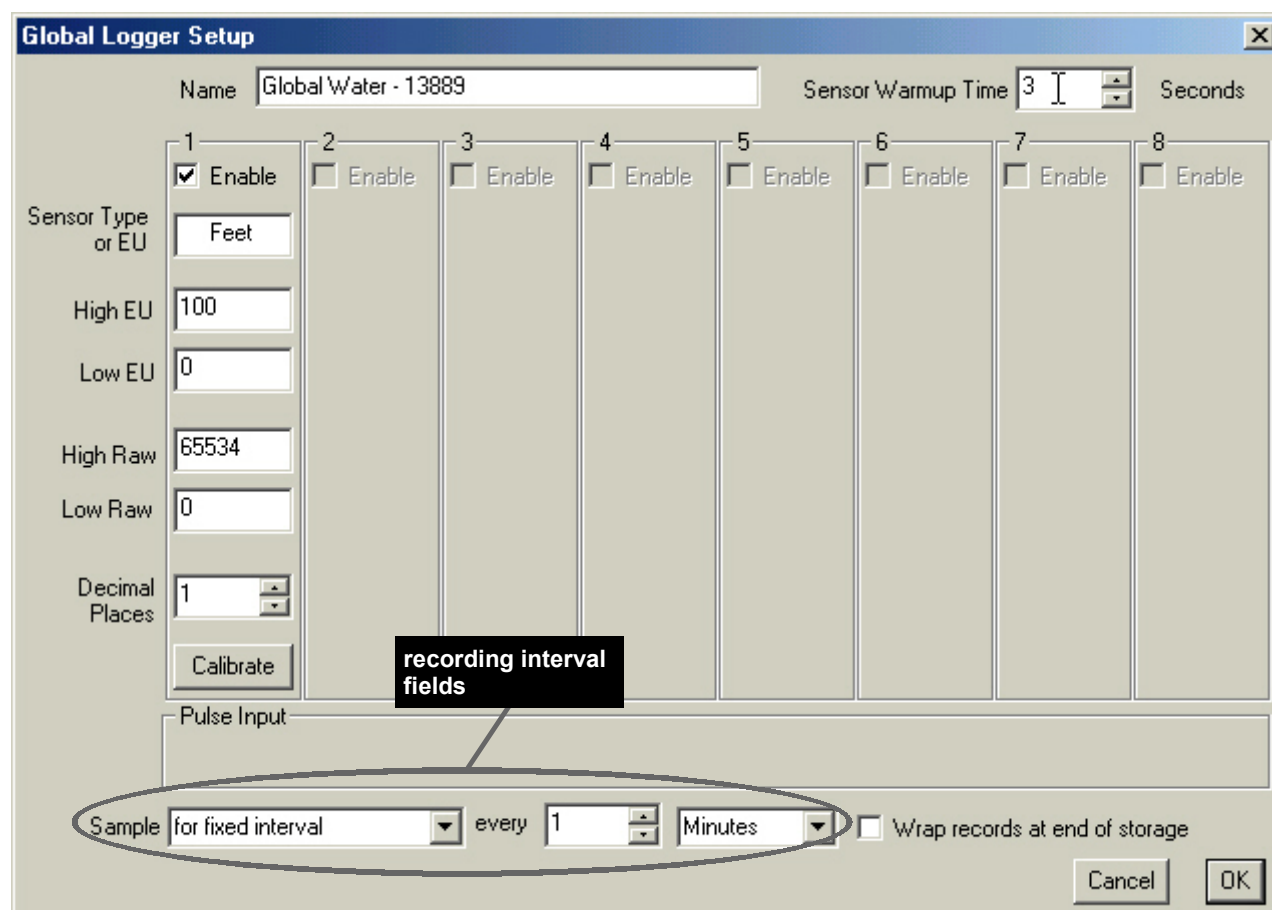
Datalogger Name and Sensor Warmup Time

If you want to change the datalogger name, click in the **Name** field and type in a new name.

Global Water recommends that the **Sensor Warmup Time** field be set at 3 seconds to supply the level sensor with adequate power for accurate data measurements. This setting dictates the length of time power is applied to the level sensor before the datalogger takes a reading.

For example, if you set your WL15 to record a reading every 20 minutes at fixed intervals and the process begins at 12:00:00, power will be applied to the level sensor immediately and a reading taken at 12:00:03. At 12:20:00, power will again be applied to the level sensor, and the datalogger will take a reading at 12:20:03. Note that if the recording interval fields are less than or equal to the **Sensor Warmup Time** field, the sensor is powered continuously.

To change warmup time, click in the **Sensor Warmup Time** field and enter the desired time (0–15 seconds). You may also click the up/down arrows to the right of the text field to increase or decrease the value by 1.



The image shows the 'Global Logger Setup' dialog box. At the top, the 'Name' field contains 'Global Water - 13889' and the 'Sensor Warmup Time' field is set to '3' with a unit of 'Seconds'. Below these are eight columns, numbered 1 through 8. Column 1 is active, showing 'Enable' checked, 'Sensor Type or EU' set to 'Feet', 'High EU' at '100', 'Low EU' at '0', 'High Raw' at '65534', 'Low Raw' at '0', and 'Decimal Places' at '1'. A 'Calibrate' button is at the bottom of column 1. A black callout box with the text 'recording interval fields' points to the 'Sample' field at the bottom of the dialog. The 'Sample' field is set to 'for fixed interval', 'every' '1' 'Minutes'. There is also a checkbox for 'Wrap records at end of storage' and 'Cancel' and 'OK' buttons at the bottom right.

	1	2	3	4	5	6	7	8
Enable	☒	☐	☐	☐	☐	☐	☐	☐
Sensor Type or EU	Feet							
High EU	100							
Low EU	0							
High Raw	65534							
Low Raw	0							
Decimal Places	1							
Calibrate								

recording interval fields

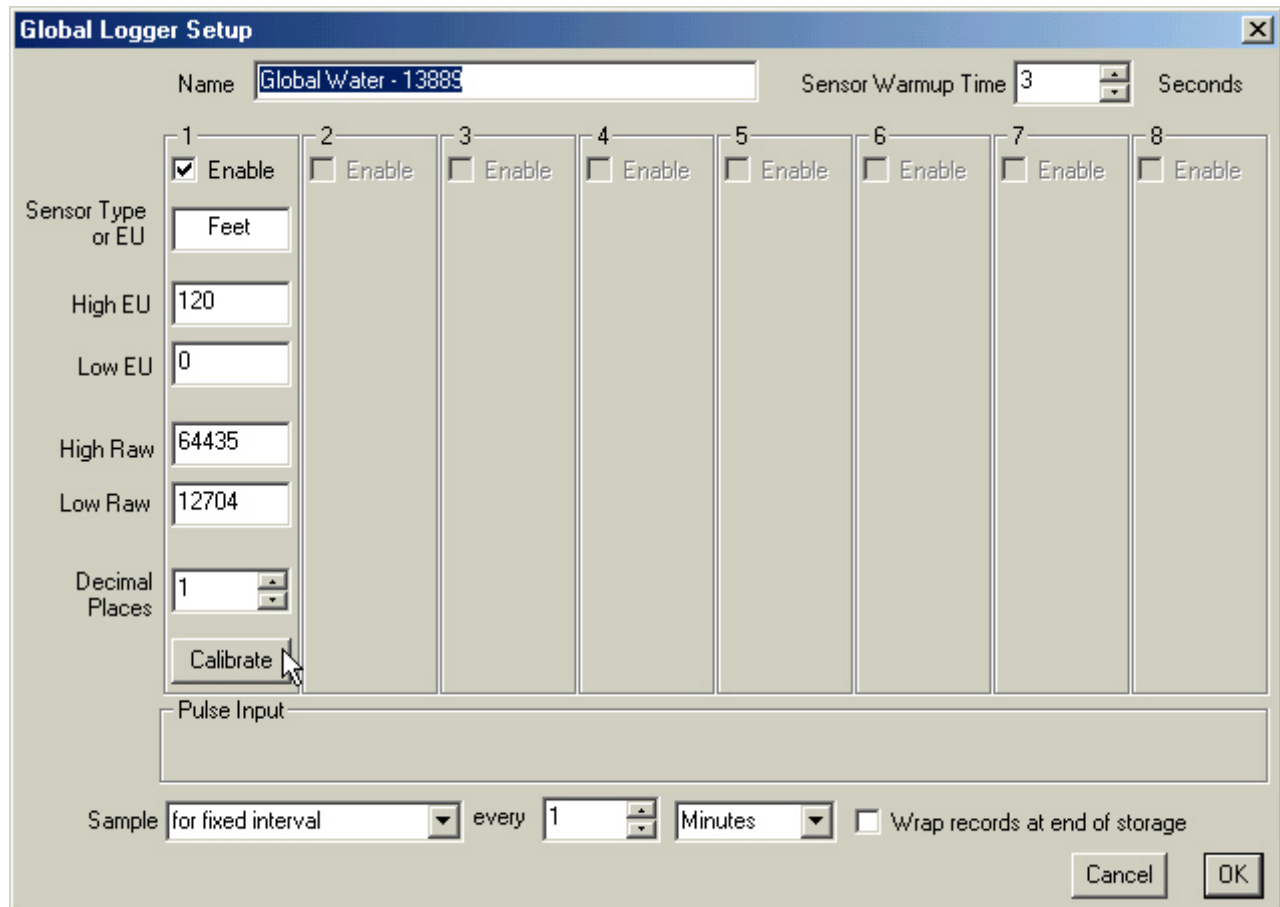
Sample: for fixed interval every 1 Minutes ☐ Wrap records at end of storage

Cancel OK

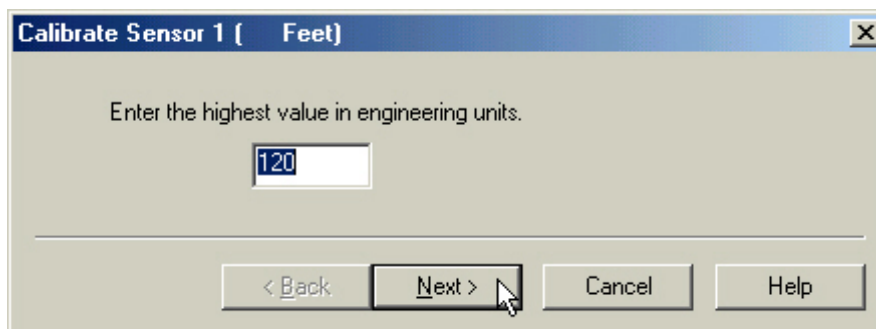
Calibration

Change the **Sensor Type or EU** (engineering units) field to the unit type you are calibrating to (i.e. meters, feet, etc.) by clicking in the field and typing the unit name. Note that the **Sensor Type or EU** field is only a text label. Actual readings are determined by the following calibration steps.

In case you make a mistake during the calibration process, write down the existing values in the **High Raw** and **Low Raw** fields before continuing (in this case **64435** and **12704**). Click the **Calibrate** button.



The **Global Logger Setup** dialog box is shown. It has a title bar with a close button. The main area contains a table with 8 columns, numbered 1 through 8. Column 1 is active. In column 1, the **Enable** checkbox is checked, **Sensor Type or EU** is set to **Feet**, **High EU** is **120**, **Low EU** is **0**, **High Raw** is **64435**, **Low Raw** is **12704**, and **Decimal Places** is **1**. A **Calibrate** button is located below the **Decimal Places** field. Below the table is a **Pulse Input** section. At the bottom, there is a **Sample** section with a dropdown set to **for fixed interval**, a **every** field set to **1**, a **Minutes** dropdown, and a **Wrap records at end of storage** checkbox. **Cancel** and **OK** buttons are at the bottom right.

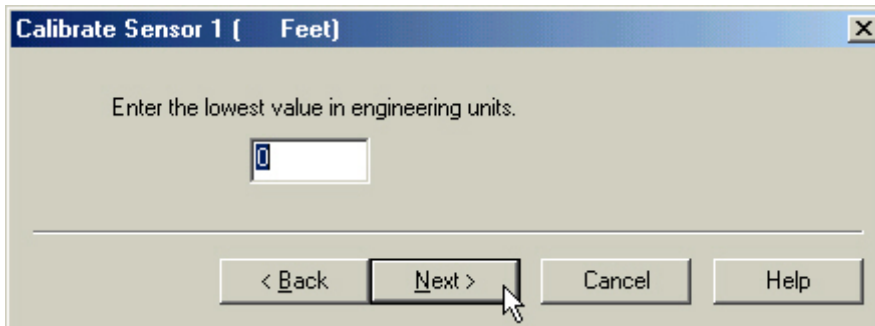
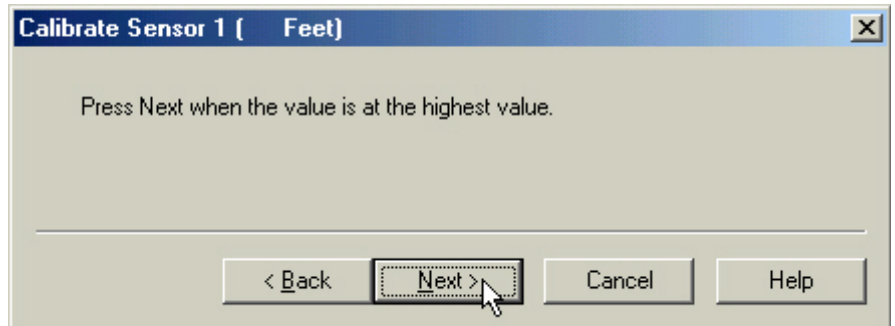


The **Calibrate Sensor 1 (Feet)** dialog box is shown. It has a title bar with a close button. The main area contains the text **Enter the highest value in engineering units.** Below this is a text field containing **120**. At the bottom, there are four buttons: **< Back**, **Next >**, **Cancel**, and **Help**. A mouse cursor is pointing at the **Next >** button.

Enter the maximum unit range of the level sensor (**120** for a 120' sensor in this example) in the **highest value** text field and click the **Next** button.

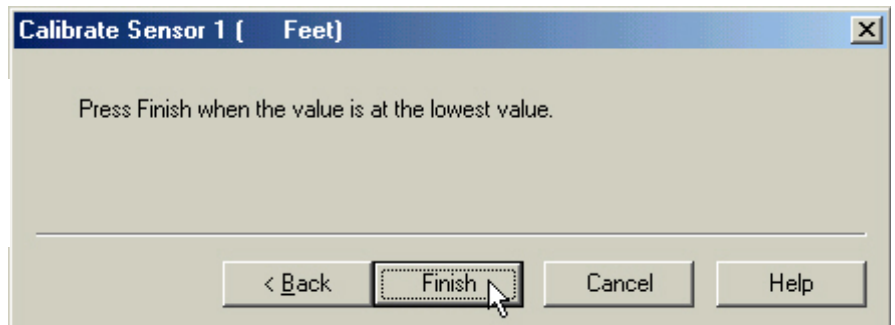
If performing a dry calibration, insert the sensor into your water pressure meter and set to full scale range of your WL15. If performing a wet calibration, insert level sensor to a water depth of at least 10% of full scale range. For example a 120' sensor should be calibrated at a depth of at least 12'. Calibrating at greater percentages (up to 100%) provides greater accuracy. Calibration depth should be measured from water surface to sensor tip.

For both wet and dry calibrations, wait at least five seconds for the level sensor to adjust to current PSI level. Click the **Next** button.

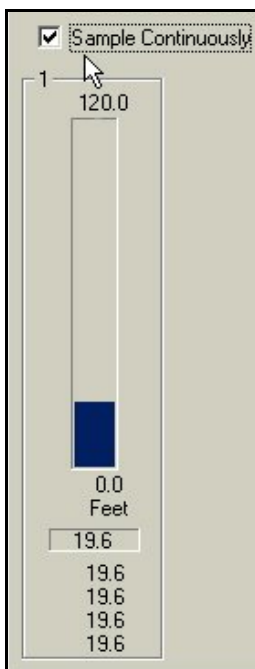


Enter **0** in the **lowest value** text field and click the **Next** button.

For dry calibrations, release the level sensor from water pressure meter. For wet calibrations, take level sensor out of water.



For both wet and dry calibrations, wait at least five seconds for the level sensor to adjust to 0 PSI. Click the **Finish** button.

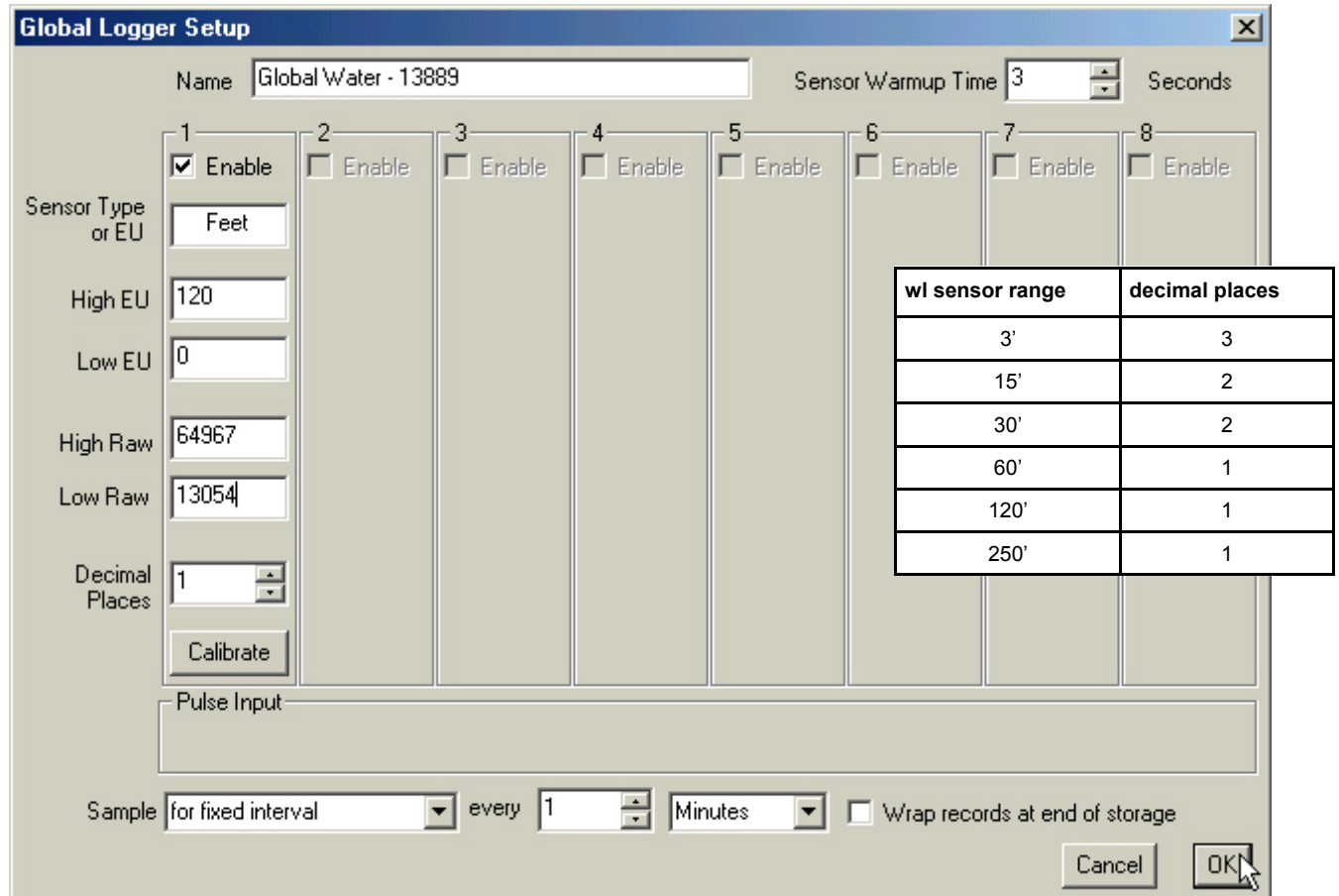


Note, that if performing a wet calibration at a fraction of total sensor range, the bar graph on the left side of the main **Global Logger** window will interpret full scale range at the calibration depth instead of actual total sensor range. All other logger operations will perform correctly. To revise calibration settings so that the graph will function correctly, follow the worksheet **Calibrating the Bar Graph to Higher or Lower Range** in **Appendix B***.

*See Appendix B: Worksheets, pages 37

Verify that **High EU** and **Low EU** fields reflect desired unit readings. Also, verify that the **High Raw** field reflects a range of 60,000 – 65,000 and that the **Low Raw** field reflects a range of 10,000 – 15,000.

Adjust the **Decimal Places** field according to the following chart (i.e. a 3' sensor should be adjusted to three decimal places).



wl sensor range	decimal places
3'	3
15'	2
30'	2
60'	1
120'	1
250'	1

Recording Interval and Memory Management

Select the interval type by clicking the down carrot of the **Sample** field. To repeatedly record values at a specified interval, click **for fixed interval**.



Note, that if you choose to record at fixed intervals, memory will fill up according to chart on the right. Refer to battery maintenance chart for battery life to available memory comparisons*.

Recording Interval	Time
1 second	6 hours, 49 minutes
1 minute	17 days
5 minutes	84 days
15 minutes	254 days
30 minutes	509 days
1 hour	1018 days

*See **Battery**, page 29

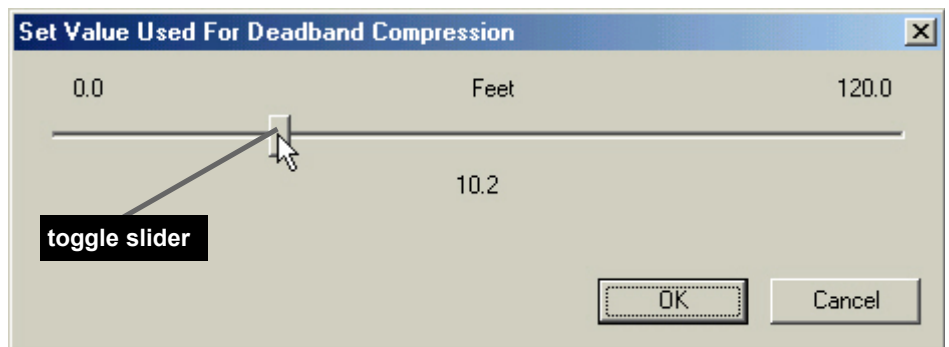
To record values according to a logarithmic curve, click **for logarithmic interval**. See chart for timeline specifications.

Time Frame	Readings per time unit	Expected total readings during Time Frame
0-19 seconds	As fast as possible	1000
20-59 seconds	1 per 1 second	40
60-599 seconds	1 per 12 seconds	45
10-99 minutes	1 per 2 minutes	45
100-999 minutes	1 per 200 minutes	45
1000-9999 minutes	1 per 1440 minutes	45

To take readings upon exceeding a specified unit range, click **upon exception**. This setting sets the logger to record a single reading after detecting a $\pm$ variance from the previously recorded exception reading. Click the long bar appearing at the bottom of the **Global Logger Setup** menu



Click and hold toggle slider with left mouse button (i.e. do not click and release). Move slider left or right to select desired exception range, and release mouse button. Click **OK** to preserve selection or **Cancel** to revert to the previous setting.



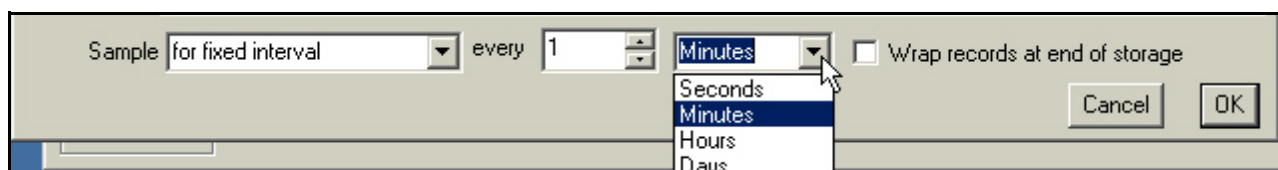
The bar should change to reflect the latest exception setting. The setting in these screenshot examples sets the logger to record a single reading after water level changes (rises or falls) by 10.2 feet from the previous exception reading.



Set the recording interval digit, by clicking in the **every** text field, and typing the desired number. You may also click the up/down arrows to the right of the text field to increase or decrease the value by 1.



Set the recording interval time unit, by clicking the down carrot of the time unit field (not labeled) and clicking **Seconds**, **Minutes**, **Hours** or **Days**.



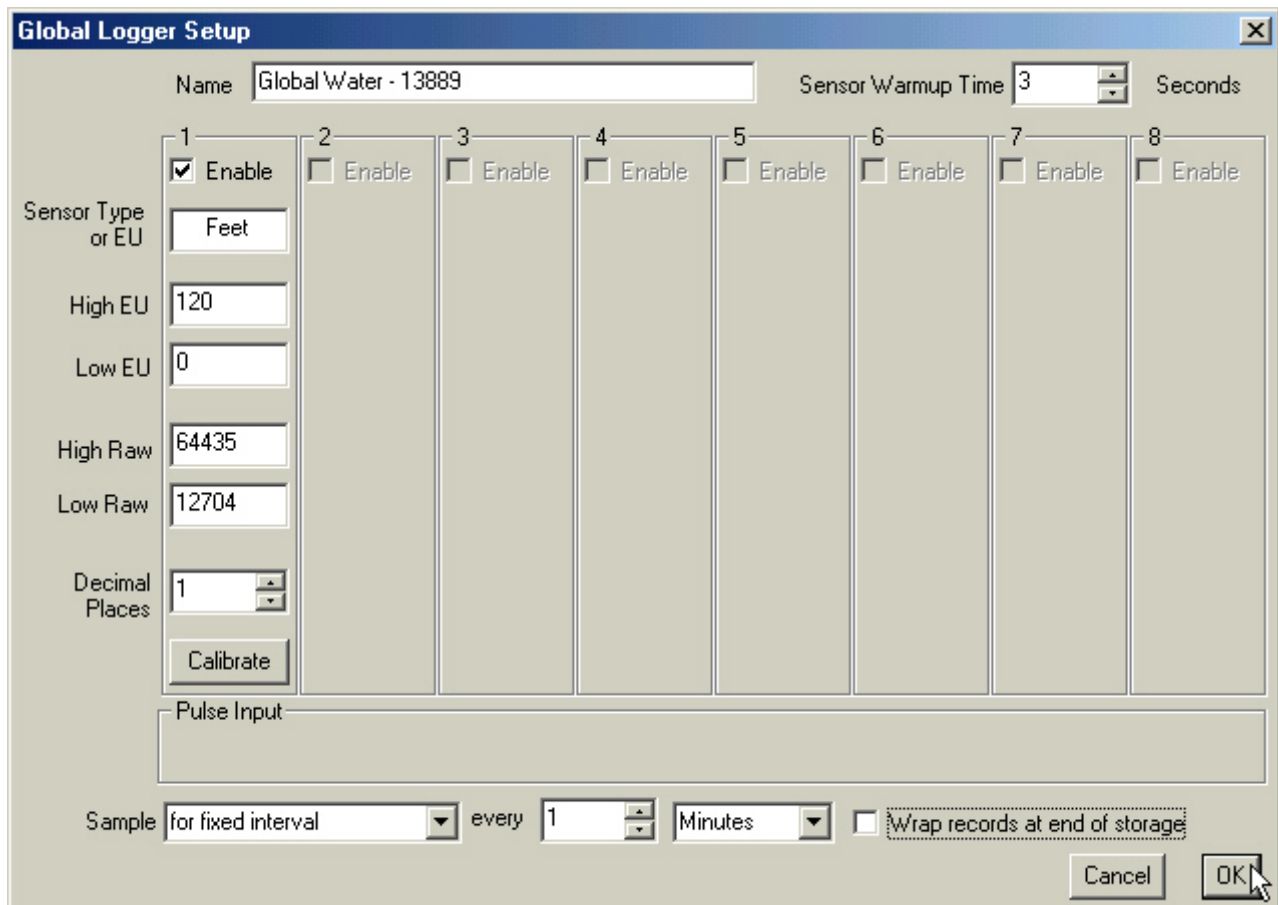
The **Wrap records at end of storage** checkbox dictates whether or not the logger continues to record readings after its memory is filled. To overwrite readings in synchronous order (earliest readings are overwritten first) after memory is filled, click the checkbox. To preserve readings and stop recording after memory is filled, leave box unchecked.



Sample every ☒ Wrap records at end of storage

After calibrating and/or changing interval recording settings, click the **OK** button. To cancel changes, click **Cancel**.

You may also manually change WL15 settings directly using a terminal program*.



Global Logger Setup

Name Sensor Warmup Time Seconds

	1	2	3	4	5	6	7	8
Enable	☒ Enable	☐ Enable	☐ Enable	☐ Enable	☐ Enable	☐ Enable	☐ Enable	☐ Enable
Sensor Type or EU	Feet							
High EU	120							
Low EU	0							
High Raw	64435							
Low Raw	12704							
Decimal Places	1							
Calibrate	Calibrate							
Pulse Input								

Sample every ☐ Wrap records at end of storage

*See Appendix D: Terminal Programming, page 40

Maintenance

4

Battery

Global Water recommends that the battery voltage be physically checked based on your recording interval*. Refer to the following table.

Note, that the WL15 uses 60 μ A while “sleeping” and 3mA plus the signal current while taking readings. This table is based on the worst-case scenario where the sensor is providing the maximum signal of 20mA.

Temperature can also affect battery life. A WL15 in an environment that has a sustained temperature of 23° C will run 5% longer than a unit that has a sustained temperature of 0° C.

Recording Interval	Theoretical Battery Life	Recommended Time Between Battery Check
1 second	43 hours	36 hours
1 minute	34 days	1 month
30 minutes	424 days	6 months
1 hour	526 days	6 months
1 day	685 days	6 months

Checking the battery requires that the WL15 cap be unscrewed. The battery should be visible and can be gently removed from the housing with fingers or a pair of pliers.



*See Recording Interval and Memory Management, pages 26 – 28

The battery must be disconnected from the battery strap. **Note, that the WL15 will stop recording, but will not lose any recordings or settings.**



Test the battery with a voltage meter. The sensor will not work reliably if the battery voltage is below 7.5V. If the battery needs to be replaced use a 9V lithium battery for reliable service. Re-attach the battery to the battery strap and gently slide it into the housing. Screw the cap on to the data logger housing, being careful not to pinch any of the wires.

Calibration

The level sensor's calibration must be periodically verified. Global Water recommends checking the sensor's calibration with a sounder or other measuring device once every 6 months.

Sensor Screen Cleaning

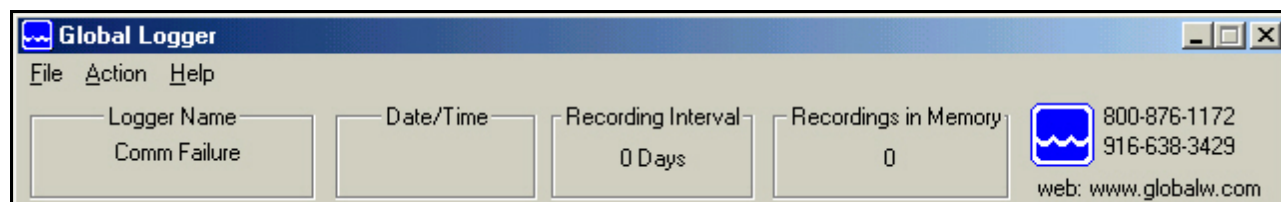
The screen on the end of the sensor must be periodically checked for clogging from mud and sludge. Wash the screen with clean water and/or scrub it gently with a toothbrush. Do not insert objects through the screen, as this may cause damage to the sensor.

Troubleshooting

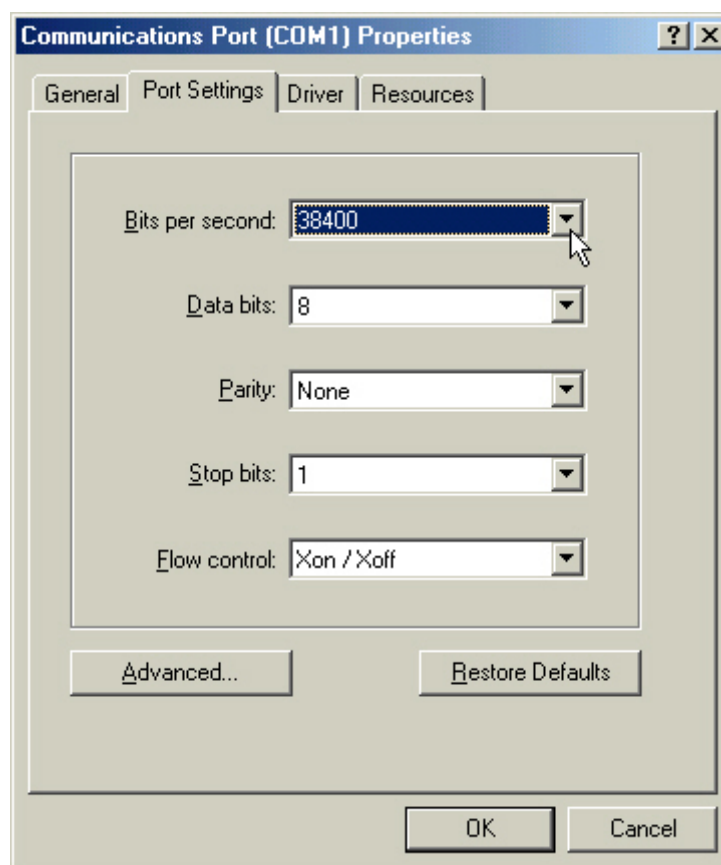
5

Comm Failure

If Global Logger software displays **Comm Failure** in the **Logger Name** field, perform the following steps



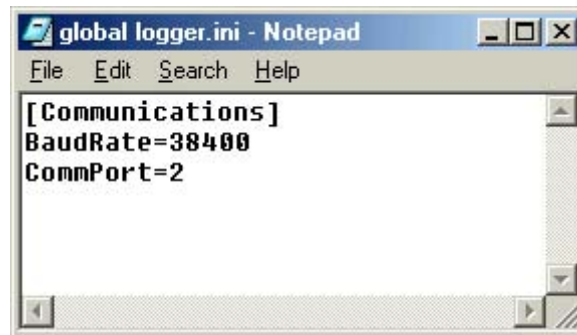
- Verify that the communication cable is securely connected to the data logger and to your computer*.
- Check the battery voltage on the logger**.
- Make sure that your computer is correctly set up to use your communication channel 1 (COM 1). Refer to the settings below for comparison.



* See **Hardware Connection**, page 17

See **Battery, page 29

- If you only have access to COM 2, then an *.ini file must be created. Open **Notepad** and type the text exactly as it appears in the following screenshot. Change the directory to the **Windows** folder of your main drive if you are using Windows 95, 98, ME or XP or to the **WINNT** folder of your main drive if you are using Windows NT or 2000. Save the file as **global logger.ini**.



- Make sure that no other software or device is using COM 1, such as an infrared port or palm synching software.

Sensor Reading Incorrectly

- Verify that the vent tube has not been kinked or sealed. The sensor uses this tube to compensate for barometric pressure changes.
- Clean the sensor following the maintenance instructions*.
- Recalibrate the sensor using the calibration methods described in the **Calibration** section of this manual**.

Water in the Vent Tube

If water gets into the cable's vent tube, place it next to a heater for 24 hours to dry the inside of the cable.

Other Issues

- Refer to the manual for proper set-up.
- Check all connections.
- Call Global Water for tech support: 800-876-1172 or 916-638-3429 (many problems can be solved over the phone). Fax: 916-638-3270 or Email: globalw@globalw.com. When calling for tech support, please have the following information ready;
 1. Model number
 2. Unit serial number
 3. P.O. number the equipment was purchased on.
 4. Our sales number or the invoice number.
 5. Repair instructions and/or specific problems relating to the product.

Be prepared to describe the problem you are experiencing including specific details of the application, installation, and any additional pertinent information.

* See **Sensor Screen Cleaning**, page 30

See **Calibration, pages 24 – 26

- In the event that the equipment needs to be returned to the factory for any reason, please call to obtain an RMA number (Return Material Authorization). Do not return items without an RMA number displayed on the outside of the package.

Clean and decontaminate the WL15 if necessary.

Include a written statement describing the problems.

Send the package with shipping prepaid to our factory address. Insure your shipment, since Global Water's warranty does not cover damage incurred during transit.

Warranty

Global Water Instrumentation, Inc. warrants that its products are free from defects in material and workmanship under normal use and service for a period of one year from date of shipment from the factory. Global Water's obligations under this warranty are limited to, at Global Water's option: (I) replacing or (II) repairing; any products determined to be defective. In no case shall Global Water's liability exceed the products original purchase price. This warranty does not apply to any equipment that has been repaired or altered, except by Global Water Instrumentation, Inc., or which has been subject to misuse, negligence or accident. It is expressly agreed that this warranty will be in lieu of all warranties of fitness and in lieu of the warranty of merchantability.

The warranty begins on the date of the invoice.

Appendix A: WL15 Detailed Specifications

A

Datalogger

Inputs

- Channels: 1 Analog
- Range: 4 – 20 mA
- Storage Resolution: 1 / 65535 (16 bit)
- A/D Resolution: 1 / 4095 (12 bit)

Data Storage

- Memory Size: 2MB (24,000 recordings)
- Type: non-volatile Flash
- Intervals: 1 – 256 seconds, 1 – 256 minutes, 1 – 256 hours, or 1 – 256 days
- Time Accuracy: 0.0015%
- Time Format: Month / Day / Year Hour / Minute / Second

Communication

- Speed: 38,400 kbs
- Data Transfer: 2MB / 4 min.
- Type: RS232C (Serial)

Electrical

- Battery: 9V Lithium (1A / h)
- Back-up Battery: 3V Lithium (950 mA / h)
- Sleep Current: 60 μ A
- Wake Current: 3 mA + Sensor (4 – 20 mA)
- Communication Current: 100 mA

Environmental

- Operating Temperature: -40 to 75° C (-40 to 170° F)
- Storage Temperature: -50 to 90° C (-60 to 200° F)
- Humidity: 0 to 95% Non-Condensing (Conformal Protection Coating)

Physical Dimensions

- Body OD: 45mm (1.77")
- Cap OD: 57mm (2.24")
- Length: 315mm (12.4")
- Weight: ~450g (16 oz.)



Sensing Element

- Output: 4 – 20 mA
- Range: 0 – 3', 0 – 15', 0 – 30', 0 – 60', 0 – 150', 0 – 250'
- Accuracy: $\pm 0.2\%$ FS (35° F to 70° F)
- Linearity and Hysteresis: $\pm 0.1\%$ FS
- Resolution: Infinitesimal (Analog)
- Operating Voltage: 10 – 36 VDC
- Current Draw: 4 – 20 mA
- Warm-up Time: 10 ms minimum
- Operating Temperature: -40 to +85°C (-40 to +185°F)
- Size of Probe: 3/4" diameter x 4 1/2" long
- Weight: 0.5 lb
- Overpressure: X4
- Burst Pressure: X10
- Material: Fluorosilicone
- Type: Differential (Wet/Wet)
- Compensated Temperature Range: 0 to 50°C (32 to 122°F) submerged

Housing

- Material: 304L SS
- Diameter: 19 mm (0.75")
- Length: 200 mm (8")
- Weight: ~115g (4 oz)

Cable

- Conductors: 4 each 22 AWG
- Jacket Material: 87A shore hardness Polyurethane
- Optional Jacket: Fluorinated Ethylene Propylene (FEP) Teflon
- Cable OD: 7.8 mm (0.307")
- Vent Tube: HD Polyethylene
- Shield: Aluminum Mylar
- Temperature range: -30 – 85°C (-22 – 185°F)
- Weight: ~65 g / m (0.7 oz / ft)

Appendix B: Worksheets

B

Calibrating the Bar Graph to Higher or Lower Range

With some sensors it is either impractical or unfeasible to reach the full-scale or lower scale of its range. This will not affect the actual reading of the datalogger but it will cause the bar graph to work incorrectly.

Here are the equations for finding new limits on the bar graph. First take the two coordinates that were found during calibration*.

(High EU _____, High Raw _____) and
(Low EU _____, Low Raw _____).

Now calculate the slope using this equation:

$$m = (\text{High Raw} - \text{Low Raw}) / (\text{High EU} - \text{Low EU})$$
$$m = \underline{\hspace{2cm}}$$

Next find the y-intercept:

$$b = \text{High Raw} - (m \times \text{High EU})$$
$$b = \underline{\hspace{2cm}}$$

Now you can calculate the new “Raw” value for any Engineering Unit.

$$\text{New Raw} = (m \times \text{New EU}) + b$$
$$\text{New Raw} = \underline{\hspace{2cm}}$$

Finally, enter these new “Raw” values into your datalogger and verify the readings are correct*.

*See Calibration, pages 24 – 26

Calibrating Level Sensors for Depth to Water Readings

Note, that to take depth to water readings, the bar graph must be calibrated to the full scale of the sensor. Follow the worksheet **Calibrating the Bar Graph to Higher or Lower Range***.

The first step is to find the Total Depth of the sensor. This is the distance from the end of your sensor to your datum. (Cable lengths from the factory are not exact. You may need to measure for precise distances.)

Total Depth = _____

Next, find the maximum Sensor Depth (range of the sensor). In the **Calibration**** section of the software, you can find this value by using the following equation:

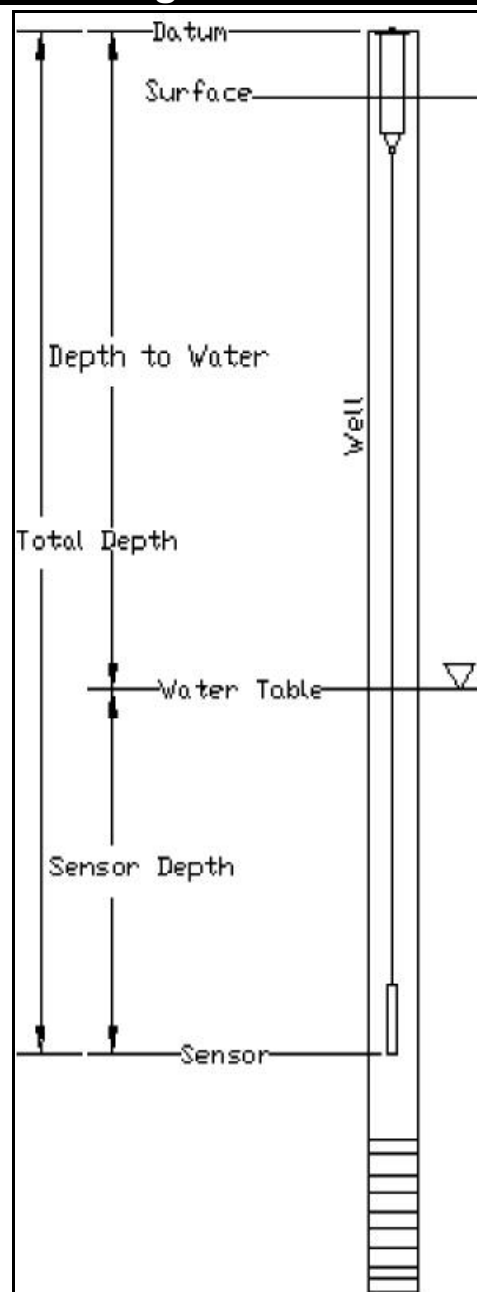
Sensor Depth = | High EU _____ - Low EU _____ |
Sensor Depth = _____

Now you can find your new Engineering Units using these steps:

New Low EU = Total Depth
New Low EU = _____

New High EU = Total Depth – Sensor Depth
New High EU = _____

Finally, enter these New EU values into your datalogger and verify the readings are correct**.

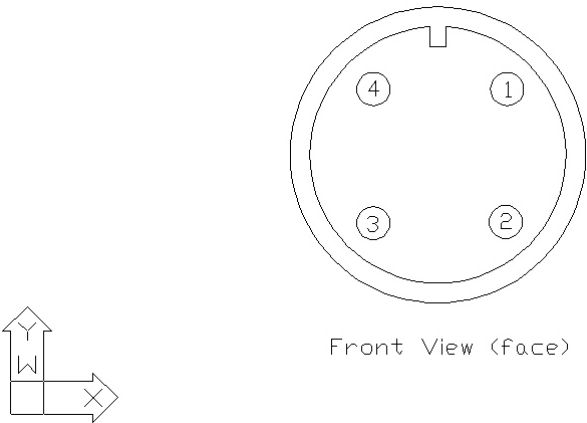


* See Appendix B: Worksheets, page 37

**See Calibration, pages 24 – 26

Appendix C: Cable Configuration C

The following diagram details the pin layout of the male communications cap on the WL14/15 Datalogger series. The chart explains the communications wiring.



Comm. Cap Pin Number	Comm. Cap Wire Color	Function	9 pin D-sub Pin Number (Male)
1	Green	Dig. Ground	5
2	Blue	DTR	4
3	Violet	Rx	3
4	Red	Tx	2

Appendix D: Terminal Programming

D

Communication Commands for Windows Datalogger

The following is a chart of commands that can be sent to the Windows Datalogger through a terminal program.

Command	Description
D	Set Date
T	Set Time
?	Get number of data points
h	Get first historical data point
a	Get historical data point again
X	Abort
i	Get next historical data point (increment)
E	Erase
r	Get real time data point
!	Set description
1	Get description
@	Set Units
2	Get Units
#	Set Raw Scale
3	Get Raw Scale
\$	Set Engineering Unit Scale (EU)
4	Get Engineering Unit Scale (EU)
N	Set Name
n	Get Name
S	Set Sample interval
s	Get Sample interval