



Instruction Manual

for the

AquaLogger™

Multiparameter Water Quality

Logger & Utilities

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1. Introduction

This manual covers the setup, operation and maintenance of the Aquaread AquaLogger, and should be read in conjunction with the latest revision of the Aquaread Aquameter Instruction Manual.

1.1. What does it do?

The Aquaread AquaLogger is a data logging device for use in conjunction with any model Aquaprobe or the AquaPlus optical DO/EC probe. The distance between the AquaLogger and the Aquaprobe can be up to 100 meters. The AquaLogger is the same diameter as the Aquaprobe and can be suspended in a well or borehole above the Probe.

The AquaLogger is powered by two standard alkaline 'C' cells that can give over 6 months continuous logging, dependent upon logging and event testing rates set. One set of alkaline batteries will log approximately 12,000 complete sets of data. The full memory capacity is 32,000 complete sets of data.

The logging rate can be set between 1 minute and 120 hours (5 days). An event trigger can also be set that will increase the logging rate if a selected parameter changes rapidly.

Dependent upon the specification of Aquaprobe selected, the following can be logged: Depth, Turbidity, pH, ORP, EC, RES, DO, TDS, SAL, SSG, Temperature and Barometric Pressure.

Setup of the AquaLogger and data retrieval is done via a USB cable on a PC running LoggerLink utility software. See section 4 for further details.

2. What's in the Box?

The AquaLogger is supplied with the following:

- The AquaLogger unit.
- USB Cable for setup and downloading logged data to a PC.
- CD containing LoggerLink software, USB drivers and this Instruction Manual.

2.1. The AquaLogger and the Environment

The AquaLogger is designed to be used outdoors and is rated to IP67, that is to say it is waterproof but it **is not** designed for submersion. Depth and Dissolved Oxygen measurements rely on the ability of the AquaLogger to read atmospheric pressure. If the unit is submerged, the depth measurement feature will not work and the Dissolved Oxygen readings will be erroneous.

Please note that the flying socket on the AquaLogger is only waterproof when the associated Aquaprobe plug is fitted. Without the plug fitted, water can enter the socket. Damage caused to the flying socket by water ingress is not covered by your warranty.

You may notice a small hole on the underside of the unit. This is a waterproof vent for the internal barometric sensor. **Do not poke anything in this hole!** Doing so will cause major damage to the vent's waterproof membrane and invalidate your warranty.

2.2. About the Support Cables

The AquaLogger is designed to be used with two stainless-steel support cables, which are available to special order from Aquaread Ltd. One cable should be attached to the top of the AquaLogger unit and should be used to support the entire assembly.

A second cable should be attached to the bottom of the AquaLogger and should support the Aquaprobe and provide strain-relief for the Aquaprobe electrical cable. A Probe Hanger should be attached to the top of the Aquaprobe and the stainless-steel support cable should be hooked on as shown in Section 5.

3. Battery Installation and Care

The AquaLogger requires two good quality alkaline C size batteries. To install the batteries, grasp the knurled section at the top of the AquaLogger and unscrew the body cap from the AquaLogger body.

The battery compartment inside the AquaLogger body has a second cap marked BATTERY. Unscrew the cap from the battery compartment and insert two C cells with the positive terminals both facing up. Replace the battery compartment cap. As the battery compartment cap is replaced, the blue LED on the bottom of the AquaLogger should illuminate for five seconds then go out. Apply some silicone grease to the thread and O ring then screw the body cap back on to the AquaLogger body. Be sure to tighten the two halves properly.

3.1. Choice of Battery Type

Always use good quality Alkaline batteries. **Rechargeable batteries should never be used**, as these will lose their charge after a month or so of use due to internal current leakage. If the AquaLogger is to be out of use for a long period, remove the batteries to prevent damage due to possible leakage.

3.2. Battery Life

The life of the primary C cells is dependent upon the logging rate. During setup of the AquaLogger using LoggerLink software, the estimated battery life will be displayed and updated as you alter the logging rate settings.

3.3. Battery Condition Monitoring

Battery condition is continuously monitored by the AquaLogger. When an Aquaprobe is first connected, if a low battery condition is detected, the blue LED on the base of the AquaLogger will give a triple flash every two seconds. The batteries should be replaced as soon as possible if this indication is given.

If the batteries are too low to operate the unit reliably, the blue LED on the base of the AquaLogger will give four flashes every two seconds. The unit will not log data if this condition exists. Actual battery capacity and estimated battery life remaining can be measured at any time by connecting AquaLogger to a PC running LoggerLink Logger Utility software.

3.4. Prior to First Use

Prior to first use, the AquaLogger must be set up. To do this, the AquaLogger must have batteries fitted and must be connected to a PC running LoggerLink Logger Utility software.

Important: Install the LoggerLink Software BEFORE connecting the AquaLogger to your PC for the first time.

4. LoggerLink Logger Utility PC Software

LoggerLink Logger Utility is a program designed to run under Microsoft® Windows® XP®, Vista® or 7 on a stand-alone PC with a minimum screen resolution of 800 x 600, a CD drive and an available USB 2.0 socket.

4.1. Software Installation

Place the LoggerLink Logger Utility CD in your PC's CD drive. Browse your CD drive and click on '**setup.exe**'. You will be given the usual Windows® security warnings. Allow the software to install. Once installed, LoggerLink will run automatically. **Leave the CD in your drive.** To communicate with the AquaLogger, two further software 'drivers' need to be installed.

4.2. Driver Installation

Ensure your AquaLogger has fresh batteries installed. Connect the AquaLogger to your PC using the USB cable supplied. The AquaLogger will switch itself on automatically and the blue LED will light continuously all the time the unit is plugged into your PC.

The 'Found New Hardware' wizard on your PC will automatically activate. Select the recommended option: '**Locate and install driver software**'. If given the option, **do not** allow Windows® to search the Internet for drivers. The next screen will ask you to '**Insert the disk that came with your AquaLogger**'. The CD should still be in your drive. Click on the '**Next**' button. Wait while the first driver is installed.

The next screen will ask you to '**Insert the disk that came with your USB Serial Port**'. The CD should still be in your drive. Click on the '**Next**' button. Wait while the second driver is installed. When this has completed, LoggerLink is ready to use. The CD can now be removed and is not required for subsequent operation.

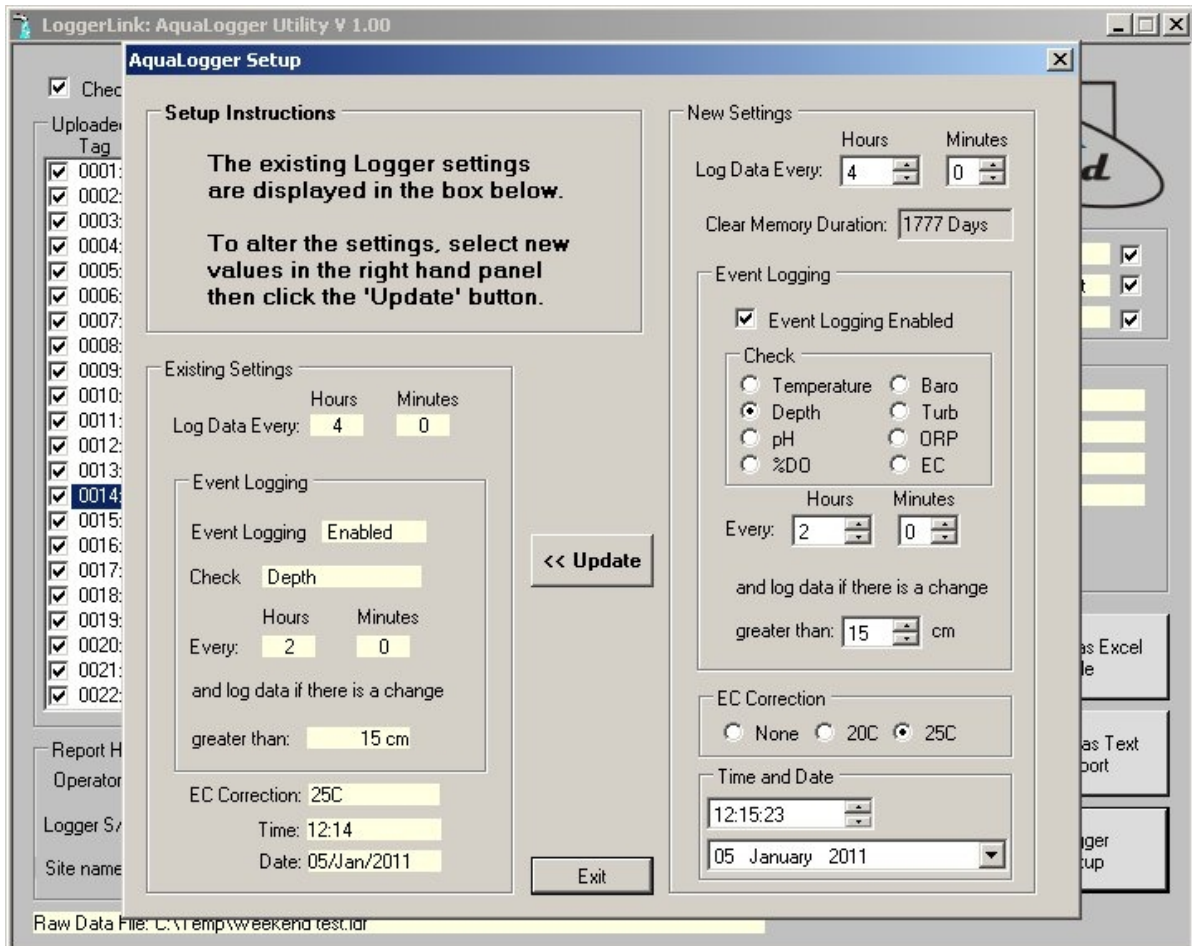
4.3. Running LoggerLink

Select LoggerLink from your Programs menu. After an introductory splash-screen has been displayed, the following screen will appear:

4.4. Logger Setup

Prior to first use, the AquaLogger must be set up. In order to do this, ensure your AquaLogger has a full set of batteries installed. Connect the AquaLogger to your PC using the USB cable supplied. The AquaLogger will switch itself on automatically and the blue LED will light continuously all the time the unit is plugged into your PC.

First click on the button labelled **Upload Data From Logger** to read the Logger's serial number, memory and battery status. Next click on the button labelled **Logger Setup**. The Setup Screen shown below will be displayed.



The existing Logger settings are shown on the left of the screen in the **Existing Settings** box along with the Logger's current time and date. The time and date values do not update in real time. They are a snapshot of the Logger's clock at the time the settings were uploaded.

To alter the Logger's settings and clock, enter the revised values in the **New Settings** box on the right of the screen then click the **<<Update** button.

4.5. Setting the Logging Rate

To set the normal logging rate of the Logger, simply set the hours and minutes values in the two **Log Data Every:** boxes. As you increase or decrease the logging rate, an estimated logging duration (based on a clear memory) will be displayed.

4.6. Event Logging

In addition to regular logging, the AquaLogger can be set up to log on an event, such as a rapid rise in water level.

In order to activate event logging, first tick the **Event Logging Enabled** tick box. Next select the parameter that you want to use for event logging. In the example above, depth has been selected.

Next, select the time interval at which the event should be monitored. This value must be more regular than the normal logging rate. In the example above, the depth will be monitored every two hours. As you increase or decrease the event logging rate, the estimated logging duration will be updated.

Finally, set the trigger point for the event logging, in other words, the amount the value has to change from the previous reading in order to be logged.

So, in the example above, the depth will be monitored every two hours but will only be logged if it varies by more than 15cm from the previous logged value.

4.7. EC Correction

The AquaLogger reads and stores Electrical Conductivity (EC) in an absolute form from the Aquaprobe. Prior to output to LoggerLink, the EC can be corrected to correspond to a reference temperature of either 20°C or 25°C. EC referenced to 25°C is usually preferred in the USA whereas EC referenced to 20°C is generally used throughout Europe.

To choose the way in which EC is reported, simply click one of the three settings within the EC Correction box.

4.8. Setting the Logger Time and Date

When the setup screen is entered, the current time and date from your PC will be inserted in the Time and Date box. To alter these values, simply use your mouse.

4.9. Updating the Logger

Once you are satisfied with the new settings you have made and are sure that the time and date are correct, click the **<<Update** button. All the values from the **New Settings** box will be transferred to the AquaLogger. The AquaLogger will then copy the values back to the **Existing Settings** box. Verify that the new settings have been made correctly, then click the **Exit** button to return to normal operation.

A revised estimated memory and battery life will be shown based on the changes you have made to the settings.

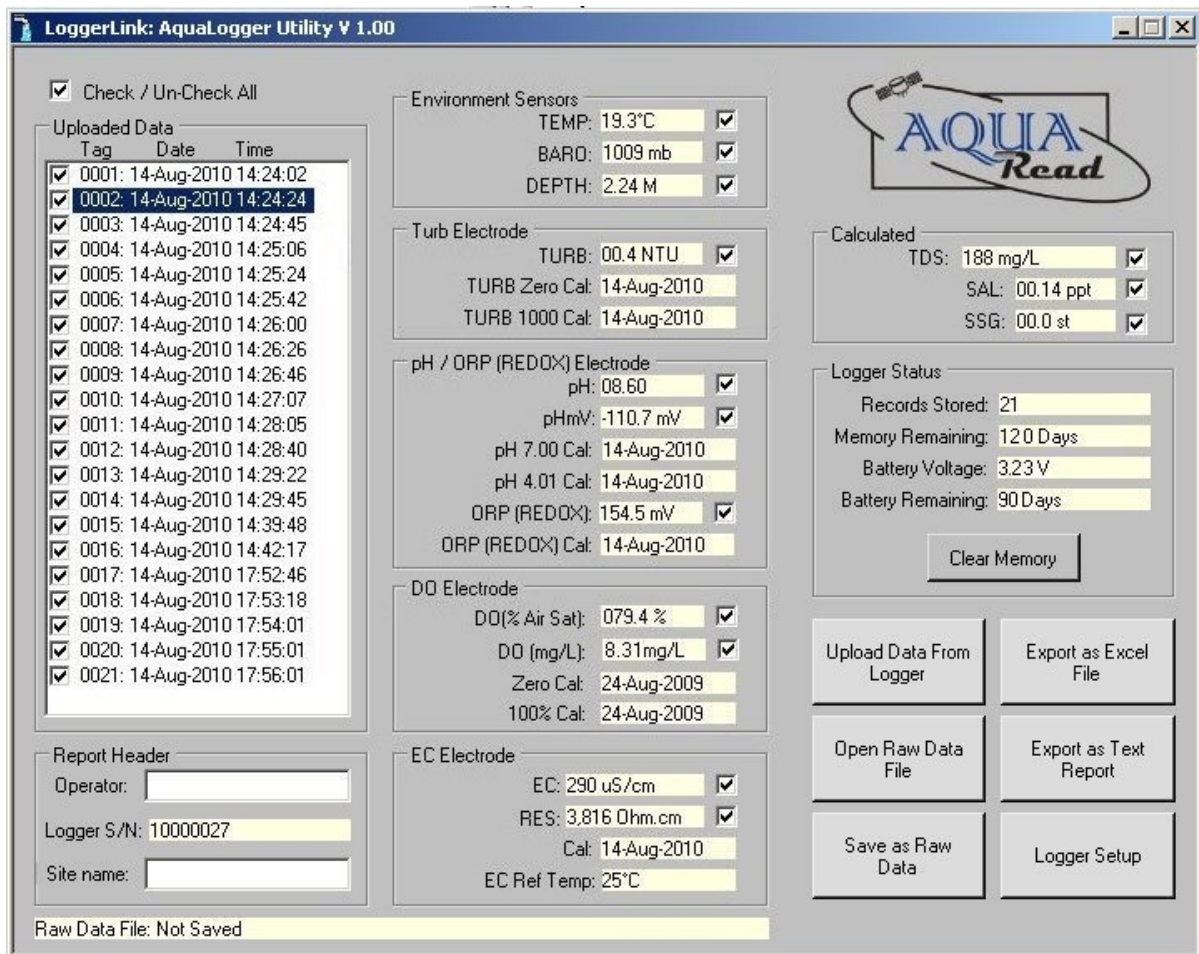
Please note: If you remove the AquaLogger batteries, you will need to re-connect the AquaLogger to a PC and reset the time and date. If you do not reset the time and date, the AquaLogger will re-start the clock at the last logged time and date.

4.10. Uploading Data from the AquaLogger

Ensure your AquaLogger has batteries installed. Connect the AquaLogger to your PC using the USB cable supplied. The AquaLogger will switch itself on automatically and the blue LED will light continuously all the time the unit is plugged into your PC.

Click the **'Upload Data From Logger'** button. LoggerLink will search for the AquaLogger then upload all the available logged data from the Logger to your PC. A progress bar and file counter will be displayed during this process.

Once upload is complete, the memory Tag, date and time for all the logged data that has been uploaded will be displayed in the **Uploaded Data** column on the left of the screen.



To view any of the logged data records, simply click on the desired Tag, date and time label as shown above. The data for the highlighted label will be displayed in the individual data boxes, which are grouped by electrode function. Any data that is unavailable or out of range will be displayed as either blanks or dashes. To move up and down the Tag/date/time column, use either your mouse or the cursor up/down keys.

The box on the right of the screen labelled **Logger Status** gives important information concerning the current status of the AquaLogger. The top box shows the total number of records stored in the Logger. The second box shows an estimate of the number of logging days remaining at the current logging rate. The third box shows the current battery voltage and the bottom box shows an estimated battery life based on the current logging rate.

4.11. On Screen Help

Help has been provided in this software in the form of 'Tool Tips'. If you want to know what a control button does or what a data box displays, simply move your mouse pointer over the item in question. A Tool Tip will appear after a few seconds to give you more information.

4.12. Saving Logged Data

Once a set of logged data has been uploaded from the AquaLogger, it can be saved on your PC as a Raw Data file. These files use a proprietary format and are saved with a .ldf (logger data file) extension.

To save the uploaded data, click the '**Save as Raw Data**' button. You will be asked for a file name in the normal Windows® format. The file name you choose will automatically be given the .ldf extension.

Useful Tip: Once you have saved the logged data, it is a good idea to clear the AquaLogger's memory so next time you log data, you don't get both your old data and new data uploaded to your PC.

4.13. Retrieving Logged Data

Once a Raw Data file has been saved using the above technique, it can be easily retrieved by clicking on the '**Open Raw Data**' button. When a raw data file is opened, it will appear exactly as uploaded data and the file name will be displayed in the box below the Report Header box. The Logger Status box will remain blank.

4.14. Exporting Data

LoggerLink can export data in two different formats. Before exporting data, the actual data to be exported must be selected. First, select which data records you want to export by checking the relevant check-boxes in the Uploaded Data column. You can check or un-check all data records simultaneously by checking or un-checking the 'Check / Un-Check All' box above the Uploaded Data column.

Next, select which individual data classes you want to export by checking or un-checking the check-boxes next to each individual data box. You are now ready to export your data.

4.15. Exporting Text Reports

To export a text report, first fill in the boxes in the group marked **Report Header** on the left of the screen. The Logger's serial number is automatically inserted. This information will be used at the beginning of your report. Next, click on the '**Export as Text Report**' button. You will be asked to specify a file name. A .txt extension will automatically be added.

A report will be generated that consists of a cover page giving the start and end date and time, the total number of readings, an analysis of the highest and lowest readings, the variance between the highest and lowest readings, the average readings and the GLP calibration data for the Aquaprobe used to take the readings. Each block of individual readings, laid out in chronological order, follows this page. This report can be imported into any text editor or word processor package.

Useful Tip: Of the two text editors supplied with Windows®, Microsoft® WordPad is the preferred text editor for viewing LoggerLink Text Reports as this handles text file formatting better than Microsoft® Notepad.

A typical report cover page follows:

LoggerLink Report			

File name:	C:\Test\3 day test 024690136.txt		
Operator name:	G.E.M.		
Company name:	Aquaread Ltd		
Site name:	Test Site 4		
Start date and time:	24-Jul-2010 10:09:33		
End date and time:	27-Jul-2010 13:01:00		
Total number of readings: 877			

Highest readings			

Temp:	19.8C	Tag: 0648	Date: 26-Jul-2010
			Time: 15:51:00
Baro:	1020mb	Tag: 0315	Date: 25-Jul-2010
			Time: 12:19:00
Depth:	2.43M	Tag: 0316	Date: 25-Jul-2010
			Time: 14:19:00
Turb:	05.8 NTU	Tag: 0560	Date: 26-Jul-2010
			Time: 08:46:00
pH:	7.63	Tag: 0565	Date: 26-Jul-2010
			Time: 09:09:00
pHmV:	-36.3mV	Tag: 0009	Date: 24-Jul-2010
			Time: 10:49:01
ORP:	365.7mV	Tag: 0320	Date: 25-Jul-2010
			Time: 12:44:00
DO:	79.4% Sat	Tag: 0742	Date: 27-Jul-2010
			Time: 01:46:00
EC:	810uS/cm	Tag: 0588	Date: 26-Jul-2010
			Time: 10:51:00
RES:	1,445 Ω•cm	Tag: 0285	Date: 25-Jul-2010
			Time: 09:49:00
TDS:	526mg/L	Tag: 0588	Date: 26-Jul-2010
			Time: 10:51:00
SAL:	0.40ppt	Tag: 0001	Date: 24-Jul-2010
			Time: 10:09:33
SSG:	0.0st	Tag: 0001	Date: 24-Jul-2010
			Time: 10:09:33

Lowest readings			

Temp:	17.9C	Tag: 0254	Date: 25-Jul-2010
			Time: 07:14:01
Baro:	1005mb	Tag: 0838	Date: 27-Jul-2010
			Time: 09:46:00
Depth:	2.05M	Tag: 0744	Date: 27-Jul-2010
			Time: 09:46:00
Turb:	04.1 NTU	Tag: 0830	Date: 27-Jul-2010
			Time: 09:06:00
pH:	7.55	Tag: 0003	Date: 24-Jul-2010
			Time: 10:19:01
pHmV:	-40.8mV	Tag: 0556	Date: 26-Jul-2010
			Time: 08:24:00
ORP:	354.4mV	Tag: 0820	Date: 27-Jul-2010
			Time: 08:16:00
DO:	30.1% Sat	Tag: 0427	Date: 25-Jul-2010
			Time: 21:39:00
EC:	782uS/cm	Tag: 0149	Date: 24-Jul-2010
			Time: 22:29:01
RES:	1,358 Ω•cm	Tag: 0651	Date: 26-Jul-2010
			Time: 18:11:13
TDS:	508mg/L	Tag: 0145	Date: 24-Jul-2010
			Time: 22:09:01
SAL:	0.39ppt	Tag: 0017	Date: 24-Jul-2010
			Time: 11:29:01
SSG:	0.0st	Tag: 0001	Date: 24-Jul-2010
			Time: 10:09:33

Variance		Average values	

Temp:	1.9C	18.81C	
Baro:	15mb	1013mb	
Depth:	0.38M	2.25M	
Turb:	1.7 NTU	4.87 NTU	
pH:	0.08	7.60	
pHmV:	4.5mV	-39.09mV	
ORP:	11.3mV	358.45mV	
DO:	49.3% Sat	59.10% Sat	
EC:	28uS/cm	792.2uS/cm	
Res:	87 Ω•cm	1,415.4 Ω•cm	
TDS:	18mg/l	514.4mg/l	
SAL:	0.01ppt	0.391ppt	
SSG:	0.0st	0.00st	

Calibration (GLP) data			

Turb Zero:	24-Jul-2010	Turb 1000:	23-Jul-2010
pH 7.00:	24-Jul-2010	pH 4.01:	23-Jul-2010
DO Zero:	23-Jul-2010	DO 100%:	24-Jul-2010
EC:	24-Jul-2010	ORP:	23-Jul-2010

Blocks of individual readings, laid out in chronological order, follow this cover page. The readings picked out on the cover page can be cross-referenced to the blocks of individual readings using the Tag numbers.

4.16. Exporting Excel® Files

To export an Excel® file, click on the '**Export as Excel File**' button. You will be asked to specify a file name. A .xls extension will automatically be added. Excel® files are exported in a Tab delimited text format. This means that each data field is separated by a Tab, and each data record appears on a new line.

Excel® files are saved with a .xls extension and can be opened directly in Microsoft® Excel®. When opening a .xls file created by LoggerLink for the first time, Excel® may automatically run a 'Text Import Wizard'. Follow the three simple steps to import the file. Save the file afterwards as a 'Microsoft Excel Workbook'.

4.17. Clearing the Logger's Memory

Once the data has been uploaded from the AquaLogger and saved, the Logger's memory may be cleared by clicking on the **Clear Memory** button, which is located in the Logger Status box.

5. Installing the AquaLogger and Probe

5.1. Attaching the Probe Hanger

To attach a Probe Hanger to a Aquaprobe or an AquaPlus Probe, first loosen the cable gland collar (if fitted) and the top plastic nut and slide them a little way up the cable.

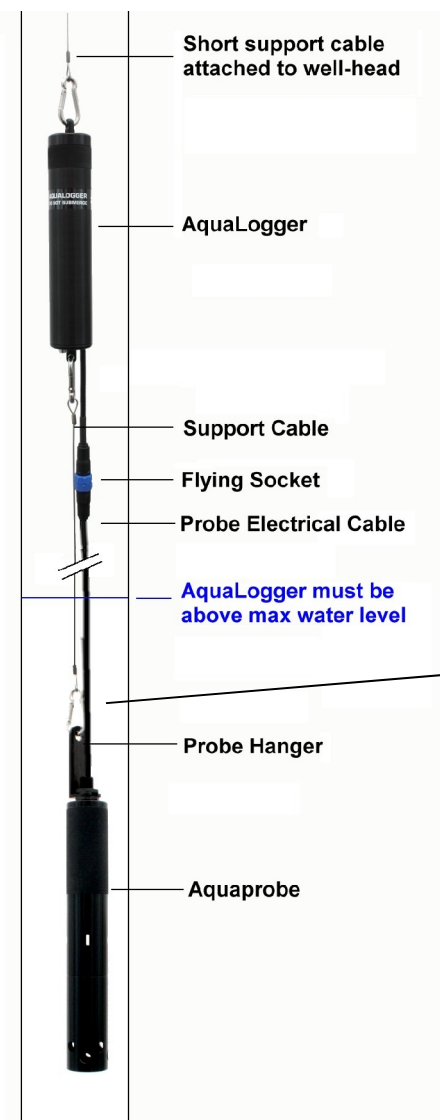
Ensure the bottom nut is tight against the top of the probe. Slide the Probe Hanger over the cable then down onto the threaded part of the Aquaprobe.

Bring the top nut down onto the thread, then use the Probe Hanger as a spanner to tighten the nut. Finally, re-tighten the cable gland collar (if fitted). The final assembly should be as shown on the right.

Attach the Probe Support Cable to the Probe Hanger with the carbine hook provided.



5.2. Typical Installation

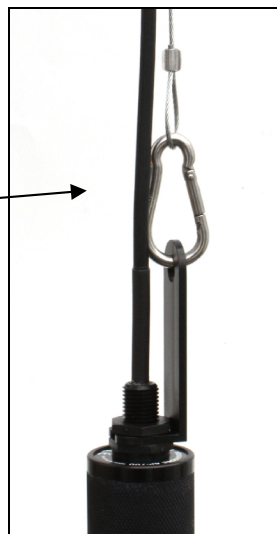


The diagram to the left shows a typical AquaLogger installation in a borehole.

A short support cable (typically 300mm) should be used to suspend the AquaLogger assembly from the wellhead.

A longer support cable should be used to suspend the Aquaprobe from the bottom of the AquaLogger unit.

The Aquaprobe must be submerged in water but **the AquaLogger must be above the maximum water level at all times.**



Aquaprobe with Probe Hanger, carbine hook and support cable attached.

5.3. Calibrating the Aquaprobe

Prior to first use, the Aquaprobe should be fully calibrated using an Aquaread Aquameter and a set of calibration standards. See the latest revision of the Aquaread Aquameter Instruction Manual for calibration procedures.

5.4. Connecting the Aquaprobe

The AquaLogger will switch on automatically when the Aquaprobe plug is inserted into the AquaLogger flying socket. The blue LED will light continuously for five seconds when the probe has been successfully recognised and initialised.

5.5. Important Information Regarding Depth Measurement

Depth is measured in the Aquaprobe by a pressure sensor mounted inside the body of the probe. The exact position of the sensor is 150mm (6") up from the bottom edge of the sleeve.

Depth is calculated by subtracting the barometric pressure being measured in the AquaLogger from the water pressure being measured in the Aquaprobe. The pressure differential, once corrected for temperature and salinity (water density), is directly proportional to depth.

The depth measurement system uses the EC sensor to detect when the probe has been placed in water. All the time the probe is measuring an EC of zero, the depth will read zero. As soon as an EC value greater than zero is detected, the Logger will start to calculate depth.

For this reason, it is important to ensure the Aquaprobe is connected to the AquaLogger prior to submerging the probe in water.

5.6. Normal Operation

Directly after connection of an Aquaprobe, the AquaLogger will take readings at two-second intervals for a period of five minutes. During this period, the LED on the underside of the Logger should give a single flash every two seconds. If the LED flashes more than once every two seconds, refer to section 5.7: LED Indications.

After the initial five minutes has elapsed, the Logger will log its first lot of data, then enter a dormant state, waiting for the next programmed logging event.

It is important that you lower the Aquaprobe into the water before this five-minute period has expired, otherwise the initial set of readings will be erroneous. It is also important to lower the Aquaprobe into the water slowly.

During the dormant state, the blue LED will not flash.

When a logging event is imminent, the Logger will leave its dormant state and take readings every two seconds for a period of twenty seconds.

During this time, the blue LED will flash every two seconds. At the end of the twenty-second reading period, the readings will be logged and the Logger will re-enter the dormant state.

5.7. LED Indications

The AquaLogger has a single, blue LED positioned on the underside. This LED is used to indicate the status of the AquaLogger by flashing at various rates. The chart below shows the possible combinations and what they mean.

Sequence	What it means	Action
Single flash	Everything is normal	No action required
Double flash	AquaLogger can not read the Probe	See Troubleshooting below
Three flash	The memory is full	Download data and clear memory
Four flashes	Battery Voltage is low	Replace the batteries
Five flashes	Battery Voltage is too low for reliable operation and the unit is no longer logging	Replace the batteries

6. TROUBLESHOOTING

This section details some of the common difficulties you may encounter when using the AquaLogger, Aquaprobes and LoggerLink software. Try all the suggested remedies. If your problem is still unresolved, contact our Service Department.

Problem	Cause / Remedy
The AquaLogger LED does not flash when an Aquaprobe is connected.	<ul style="list-style-type: none"> ✓ Batteries are probably dead or incorrectly fitted. Check you have fresh batteries fitted and that they are inserted the correct way round.
The AquaLogger LED gives a double flash when the Aquaprobe is connected.	<ul style="list-style-type: none"> ✓ Probably a poor connection. Disconnect the Aquaprobe plug, ensure there is no debris or moisture in the plug and socket, then re-connect the plug ensuring it is fully inserted and that the screw collar is fully tightened.
The LoggerLink software can not find the AquaLogger.	<ul style="list-style-type: none"> ✓ The USB drivers may not be properly installed. Reinstall the USB drivers carefully following the instructions. ✓ There may be a problem with the USB socket on the PC, try an alternative socket.
The LED on the AquaLogger does not light up when it is connected to a PC.	<ul style="list-style-type: none"> ✓ The batteries in the AquaLogger may be dead or incorrectly fitted. Check you have fresh batteries fitted and that they are inserted the correct way round. The USB cable does not power the AquaLogger. ✓ There may be a problem with the USB socket on the PC, try an alternative socket.
Battery electrolyte leakage detected in the battery compartment.	<ul style="list-style-type: none"> ✓ Remove and discard the batteries immediately. Thoroughly clean the battery compartment and terminals. If the battery terminals are corroded, contact our Service Department for return instructions.

7. DECLARATION OF CONFORMITY

The manufacturer declares that the equipment described herein is in compliance with the essential requirements and other relevant provisions of Directives 2004/108/EC and 1999/5/EC.