AQUATEC
GROUP

Temperature & Depth

SEASCAPE
SUBSEA TECHNOLOGY

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MEASUREMENT • COMMUNICATION • INSIGHT

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THE AQUATEC GROUP

Established in 1990

The Aquatec Group are creators of innovative instruments, services and solutions for measurement, monitoring and communication underwater. They provide instrumentation solutions for all water environments, including offshore structures and pipelines; oceans, estuaries, rivers and lakes; and marine mammals and fisheries.

HISTORY

Aquatec was founded by the current managing director in 1990 as a specialist consultancy in oceanographic instrumentation design. Since then, the company has established a diverse portfolio of products for measurement of physical oceanographic and process parameters including temperature, depth, vibration, attitude, suspended sediment, and marine mammal activity, as well as underwater data communication systems and marine mammal deterrents.

FACILITIES

Aquatec uses sophisticated computer-based design and leading-edge software development tools throughout all phases of the design process, thus ensuring a rapid and flexible response to customer demands. A fully equipped electronics laboratory provides all the necessary facilities for instrument development, assembly, calibration and test, while strict sub-vendor quality control ensures a consistent high quality for production component manufacture.

RESEARCH

The Aquatec Group maintains strong links with universities and research institutions around the world, and is a prominent partner in collaborative research, complementing its internal, market-led product research and development programme.

QUALITY

Measuring Temperature & Depth

Aquatec has been developing temperature and pressure loggers for many years. The range has now expanded to include reliable standalone data loggers to produce precise long term records, wireless instruments for use on commercial fishing vessels, loggers for use in the deep ocean and real time monitoring systems. Our expert team can advise you on the instrumentation and system options, and recommend the most suitable solution for you.

THE MINI LOGGER
AQUA*logger*® 520

- Compact wireless design
- Up to 5 year battery life
- Continuous & burst sampling regimes
- Maximum 1000m depth

THE WIRELESS LOGGER
AQUA*logger*® 530

- Automatic transmission of data to a remote computer via wireless technology
- Automatic display of temperature and depth data

THE MIDI LOGGER
AQUA*logger*® 540

- Compact, self-contained logger
- Real time reporting capability as standard
- Depth rated to 4000m

AQUA*logger*® 520

THE MINI LOGGER

Aquatec's primary temperature and depth model, the AQUA*logger*® 520, combines years of product development and innovative design, resulting in an easy to use and cost effective instrument. Measuring just 200mm (7.9") in length and 32mm (1.3") in diameter, the miniature instrument is appropriate for ocean, environmental and coastal applications. It can accurately measure temperature and pressure measurements at depths of up to 1000m. The self-contained design makes the AQUA*logger* 520 a flexible alternative to thermistor chains.

Key Features

- Compact wireless design
- Up to 5 year battery life
- User-friendly data upload
- Pressure to depth conversion
- Quick and easy deployment
- Suitable for freshwater and marine environments

Applications

- Temperature distribution surveys
- Time series at fixed observatories
- Environmental impact assessments
- Long term deployments
- Time series of temperature at fixed depths/points

The AQUA*logger* 520 can be deployed in a number of ways:

- From a boat
- On a subsea frame
- Attached to a structure
- On a mooring line
- On a buoy

MODELS

There are two different models available:

Model	Temperature sensor	Pressure sensor
AQUA*logger* 520T	✓	
AQUA*logger* 520PT	✓	✓

A variety of depth options of up to 1000m are available with the AQUA*logger* 520, making it ideal for both shallow and deepwater deployment. Pressure options include 5 bar (~40m), 11 bar (~100m), 51 bar (~500m) and 101 bar (~1000m).

Reliable Data Transfer

The AQUA*logger* 520 reader makes deployment of the logger quick and simple, and allows for easy download of data.

Communication between the logger and reader is wireless, negating the need for cables.

SENSOR SPECIFICATIONS

	Temperature	Pressure
Sensor type	Thermistor	Piezo-resistive bridge
Ranges	-2 to 30°C standard, other ranges on request	5 bar (~40m), 11 bar (~100m) 51 bar (~500m), 101 bar (~1000m)
Resolution	better than 0.007°C	better than 0.01% full scale
Accuracy	±0.05°C	better than 0.2% full scale*
Time constant	better than 5 seconds to 63% of the change in value	N/A

High speed temperature probe with 1 second time constant also available.

LOGGER SPECIFICATION

Data storage capacity	> 250,000 parameter readings, in non-volatile FLASH
	Option available for >500,000 parameter readings
Logging lifetime	Typically 5 years, depending on regime
Data retention	>10 years
Burst sampling	Bursts every 1 – 255 seconds or 1 – 255 minutes
Within-burst rate	From 1 Hz to once every 30 seconds
Burst averaging	Bursts may be averaged to a single data value
Logger communication	Wireless system via separate drop-in reader
Reader communication	USB 1.1, bus powered
Battery	3.6V Custom Lithium 'AA' cell - Technician replaceable
Software	AQUA*talk* for Windows for configuration and download
Attachment	Single point attachment through mounting hole or use clamp
Maximum depth	1000 m
Dimensions	200mm (7.9") long x 32mm (1.3") diameter
Weight	190g (6.4oz) in air; 41g (1.5oz) in water

* Including non-linearity, hysteresis, zero offset and end value deviation (corresponds to measured error per IEC 61298-2 at room temperature.

AQUA*logger*® 530

THE WIRELESS LOGGER

The AQUA*logger* 530WTD has an innovative design that includes the ability to transfer stored data automatically to a remote computer via wireless technology and display temperature and depth data, removing the need for a cabled connection or manual interaction. With a rugged, compact design, it is suitable for use on a variety of vessels and platforms, including fishing gear, research ships, survey boats, commercial fishing vessels and moorings.
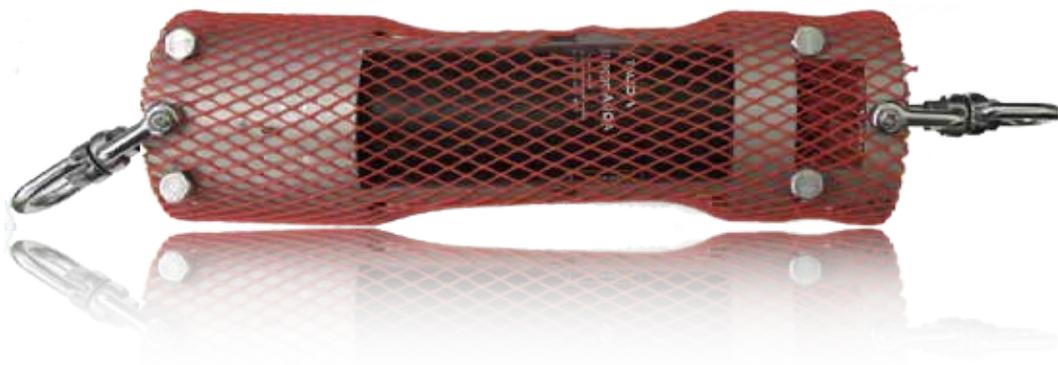
Key Features

- Wireless logger
- Automatic data display on retrieval
- Automatic download and processing
- Quick and easy deployment

Applications

- Commercial fisheries - to aid species targeting and fishing methods
- Oceanographic and environmental monitoring

Crowdsourcing - Case Study

The AQUA*logger* 530 is ideal for crowdsourcing coastal oceanographic data via vessels of opportunity such as commercial fishing boats. Temporal and spatial resolution of water column temperature data, as well as tidal cycles, can be increased in a cost effective manner, compared to data collection via traditional methods (buoys, research vessels).
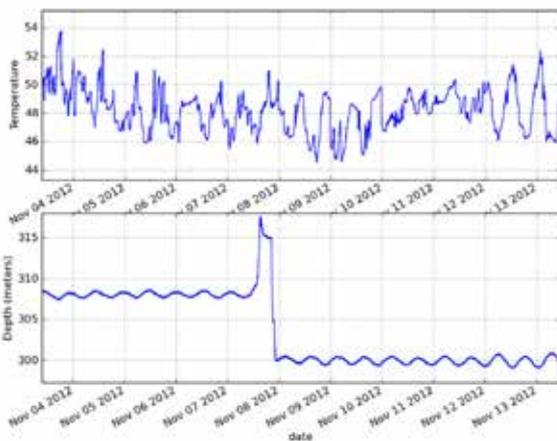

Figure 1

The AQUA*logger* 530 was used on lobster pots to give fishermen greater knowledge on the water environment and improve species targeting. Figure 1 shows that a lobster pot moved from deeper water of 317m into shallower water of 300m.

For coastal oceanographic research, the AQUA*logger* 530 is a cost-effective method of collecting temperature and depth measurements in near-real time. Figure 2 demonstrates a change from neap tide to spring tide. The temperature record shows slight deviation at the beginning of the month. However, during high tide, peaks in temperature corresponded to peaks in depth.
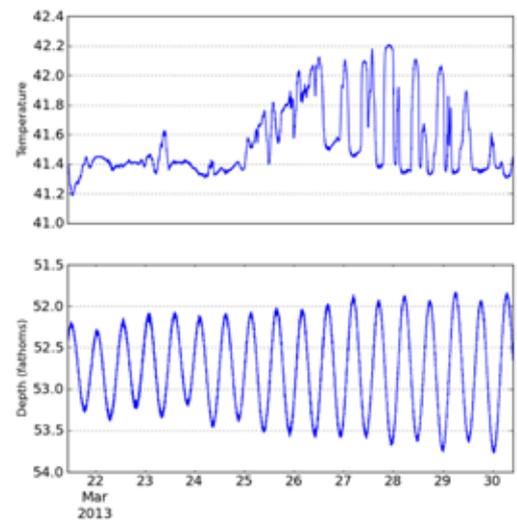

Figure 2

Benefits

- The AQUA*logger* 530WTD can provide fishermen with immediate information on the water environment when the fishing gear is retrieved. This data can then be transferred to researchers or scientists in near-real time.
- The AQUA*logger* 530WTD is a low cost instrument for obtaining valuable temperature and depth measurements.
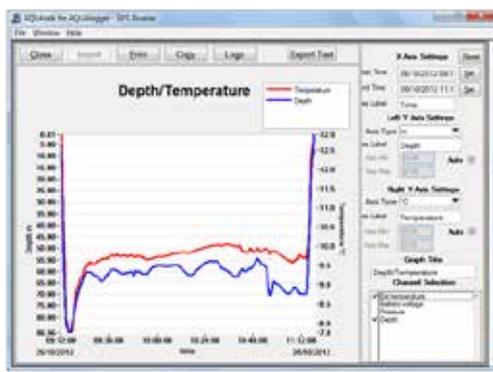
Figures 1 and 2 courtesy of NOAA

Automatic Data Transfer

On retrieval, data is transmitted **automatically** to the reader

Data is processed and a graph produced, which pops up on the computer

Near-real time data

- Data can be collected in near-real time, which is important for commercial fishing vessels, to aid fishing methods and species targeting.

- With the AQUA*logger* 530, professionals can gain a greater understanding of the water environment and respond to changes in water temperature, or the movement of fishing gear to greater water depths.

- The AQUA*logger* 530 will automatically transmit data wirelessly when retrieved, up to 100m away.

SENSOR SPECIFICATIONS

	Temperature	Pressure
Sensor type	Thermistor	Piezo-resistive bridge
Ranges	-2 to 30°C standard, other ranges on request	60 bar (~600m) (Other sensors available on request)
Resolution	better than 0.007°C	better than 0.01% full scale
Accuracy	±0.05°C	typically better than 0.2% full scale*
Time constant	better than 5 seconds to 63% of the value	N/A

LOGGER SPECIFICATION

Data storage capacity	Greater than 4M parameter readings, in non-volatile FLASH
Logging lifetime	Typically 1 year, depending on regime
Data retention	>10 years
Burst sampling	Bursts every 1 – 255 seconds or 1 – 255 minutes
Within-burst rate	From 1 Hz to once every 30 seconds
Burst averaging	Bursts may be averaged to a single data value
Logger communication	Wireless - IEEE802.15.1
Reader communication	USB 2.0, bus powered
Battery	1.5V Alkaline Battery
Software	AQUA*talk* for Windows for configuration and download
Attachment	Single or double point attachment, with holes for screw attachment and shackles (provided) for rope, shackle or carabiner attachment
Maximum depth	600m
Dimensions	200mm (7.9") long x 55mm (1.3") diameter - logger only 250mm (9.8") long x 74mm (2.9") diameter - with cage
Weight	520g (18.3oz) in air; 200g (7oz) in water - logger only 1320g (46.6oz) in air; 600g (21.2oz) in water - with cage

* Including non-linearity, hysteresis, zero offset and end value deviation (corresponds to measured error per IEC 61298-2 at room temperature.

AQUA*logger*® 540

THE MIDI LOGGER

The AQUA*logger* 540 is a self-contained temperature and pressure logger that offers simple connection, configuration and data download, and has real time reporting capability. The versatile instrument is suitable for a wide variety of applications, both oceanographic and offshore. The AQUA*logger* 540 is capable of monitoring in water depths of up to 4000m, making it a suitable choice for oceanographic research professionals.

Key Features

- Compact, self-contained logger
- Custom solutions beyond 4000m
- Quick and easy deployment
- Pressure to depth conversion
- Real time reporting capability as standard

Applications

- Deep water temperature distribution surveys
- Real time oceanographic and environmental monitoring

SENSOR SPECIFICATIONS

	Temperature	Pressure
Sensor type	Thermistor	Piezo-resistive bridge
Ranges	-2 to 30°C standard, other ranges on request	5 bar (~40m), 11 bar (~100m); 51 bar (~500m), 101 bar (~1000m), 201 bar (~2000m), 401 bar (~4000m) (Other sensors available on request)
Resolution	better than 0.007°C	better than 0.01% full scale
Accuracy	±0.05°C	typically better than 0.2% full scale*
Time constant	better than 5 seconds to 63% of the change in value	N/A

LOGGER SPECIFICATION

Data storage capacity	Greater than 4M parameter readings, in non-volatile FLASH
Logging lifetime	Depends on logging parameters - up to 1 year
Data retention	>10 years
Burst sampling	Bursts every 1 – 255 seconds or 1 – 255 minutes
Within-burst rate	From 1 Hz to once every 30 seconds
Burst averaging	Bursts may be averaged to a single data value
Communication	RS232 or RS422 (specify) and USB 1.1, bus powered
Optional extra inputs	2 channels 0-5V external
Optional controls	External trigger input or output
Battery	3 x 3.6V Custom Lithium 'AA' cell pack
Software	AQUAtalk for Windows for configuration and download
Attachment	Single attachment through mounting hole or use clamp
Maximum depth	1000m standard version (acetal) 4000m deepwater version (stainless steel)

* Including non-linearity, hysteresis, zero offset and end value deviation (corresponds to measured error per IEC 61298-2 at room temperature.

Real time Systems

Based on the established AQUA*logger* 540 temperature and depth logger, Aquatec can provide real time monitoring systems tailored to your project for applications in oceanographic, environmental and coastal monitoring and commercial fishing.

Why Choose a Real Time System?

• If you have a specific project in mind, we can help by setting up a complete real-time monitoring system designed for your application including buoys, seabed frames or solar powered shore based river stations.

• Integrate additional parameters such as turbidity, pH, DO, chlorophyll and PAR.

• Optional alarms with email or SMS notification.

• Each system comes with our bespoke AQUA*talk* software, with modifications made upon request.

• Data access can be via a dedicated shore station or remote access via a secure website.

• Installation and commissioning services can be added if additional support is needed

• Training can be provided onsite or remotely.

DESIGNED FOR YOU...

APPLICATION AND NEED

Every real time monitoring project is different, with different aims and end requirements for data. Aquatec will find the best solution to achieve your goal, whether it be complying with dredging regulations, carrying out oceanographic research or undertaking environmental monitoring.

Your experience starts with an initial consultation with one of our systems experts, who will discuss your requirements in detail.

SENSORS

Aquatec can integrate a wide range of sensors, including those listed below:

Water Quality

- Turbidity, Temperature
- Pressure, Depth
- Chlorophyll, CDOM, PAR
- Salinity, DO, pH, Redox

Hydrodynamics

- Waves, Tide,
- Water level, Currents

If you require a sensor that is not listed, let us know and we will aim to source one for you.

DEPLOYMENT METHODS

Deployment options include:

- Moorings
- Seabed frame
- From a vessel
- Attached to a structure

DATA TRANSMISSION

We will assist you in determining the most suitable method of transmitting the data from your measurement point to where you need it.

Subsea

- Cable, Acoustic modems, Optical modems

Wireless

- Mobile network, Radio, Satellite
- WiFi, Bluetooth

POWER OPTIONS

Aquatec can design a system suited to your deployment length and sampling regime. Power options include the following:

- Batteries (primary or rechargeable)
- Solar
- Wind
- External power

DATA ACCESS AND OPERATIONAL FUNCTIONALITY

Aquatec provide a complete solution including bespoke software and optional PCs. Operational functionality includes the addition of alarms and access to data via the web.

Short Range Data Transmission

AQUA*modem* Op1L

For greater flexibility in the deployment of your monitoring instruments, Aquatec Group brings you the AQUA*modem* Op1L - a new lightweight version of their standard optical modem, designed for use by divers and on small ROVs. Using established technology, the optical modem allows short range interrogation, commanding and data download from underwater equipment. The new instrument is three times lighter than the original optical modem, making it ideal for applications in oceanographic, environmental and coastal research, as well as offshore energy industries.
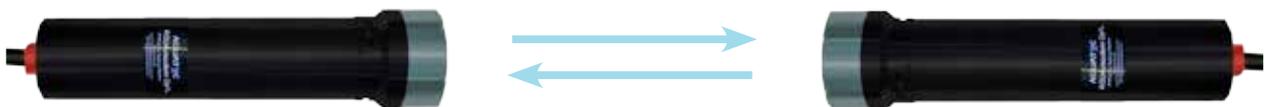
Key Features

- Short range interrogation, commanding and data download from subsea instruments
- Compatible with instruments with RS232 serial interfaces
- Depth rated to 500m

Applications

- Oceanographic, environmental and coastal research and surveys
- Oceanographic observation
- Cathodic protection and monitoring of offshore structures, shallow water pipelines, ships and boats, jetties, harbours, ports and renewable energy systems

Compatibility

- The AQUA*modem* Op1L is compatible with any instrument with an RS232 serial interface, including Aquatec's AQUA*logger* and HYDRO*log* ranges.
- The AQUA*modem* Op1L can be used with standard AQUA*modem* Op1 instruments.

TECHNICAL SPECIFICATION

Environmental	Operating Depth	500 m
	Temperature	Operating: -5°C to 40°C Storage: -40°C to 65°C
Telemetry	Light band	Cyan visible light
	Operating Range	Typically 1 m depending on environment
	Transmission type	Digitally coded telemetry with error detection
Mechanical	Dimensions	285 mm long by 72 mm max diameter; main housing diameter 60 mm
	Weight	Approximatively 1 kg in air, 0 kg in water
	Material	Acetal with perspex window
Power	External Power	ROV unit 15V to 30V Subsea unit 9V to 30V
Wake Up	Serial Wake Up	Optional on receipt of RS232 serial data for subsea unit On receipt of RS232 serial data for ROV unit
	Optical Wake Up	On receipt of optical interrogation
Interface	Electrical	RS232 levels
	Protocol	Any format – transparent link
	Bit rate	19200 baud
	Addressing	Up to 3 unique addresses, plus a universal / broadcast address

AQUA*logger*® SELECTION
GUIDE

AQUA*logger*®
Selection
Guide

	AQUA*logger*® 520 *Mini logger*	AQUA*logger*® 530 *Wireless logger*	AQUA*logger*® 540 *Midi logger*
Parameters			
Temperature	✔	✔	✔
Pressure / Depth	✔	✔	✔
Turbidity			

Features			
Max depth rating	1000m	600m	4000m
Max sampling rate	1Hz	1Hz	1Hz
Logging	✔	✔	✔
Real time as standard			✔
Memory (parameter readings)	0.25 - 0.5M	4M	4M
External batteries available			✔

Communication with instrument			
Wireless via inductive reader	✔		
Wireless		✔	
USB cable			✔

Application			
Environmental monitoring and research	✔	✔	✔
Oceanographic monitoring and research	✔	✔	✔
Operational fisheries / aquaculture	✔	✔	✔

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