

Aquatec Solutions

CUSTOM SUBSEA MEASUREMENT &
COMMUNICATION SOLUTIONS



Aquatec has a long history of innovation and was founded in 1990 by the current managing director as a specialist consultancy in oceanographic design. Since then, the company has established a diverse portfolio of products for the measurement of oceanographic and process parameters, as well as establishing a range of services including instrument and communication design.



Aquatec Solutions - an overview

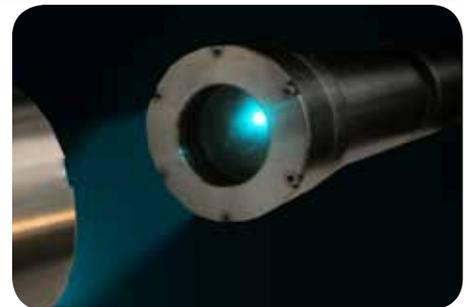
Custom solutions to subsea measurement and communication problems.

Page 2

Subsea Communication Solutions

Solutions for downloading and transferring data subsea, as well as commanding and controlling subsea instruments.

Pages 3-5



Design Services

Custom design services for a wide range of subsea measurement and communication requirements.

Pages 6-10

Instrument Design

Custom instrumentation for specific measurement requirements.

Pages 6-7



System Design

Custom engineered solutions to diverse subsea measurement and communication problems.

Pages 8-10

Aquatec was founded by the current managing director in 1990 as a specialist consultancy in oceanographic instrumentation design. Over the years, Aquatec has expanded its offering to include communication and system design, as well as consultancy, for all water environments and applications.



EXPERTISE

Aquatec Group employs highly qualified engineering personnel with extensive expertise in oceanographic and offshore applications. In-house expertise includes:

- Oceanographic instrumentation - Low power data loggers
- Digital signal processing - Underwater acoustic communication
- Temperature and pressure measurement - Corrosion and cathodic protection
- Underwater optical instrumentation - Suspended sediment acoustic characteristics
- High frequency acoustics - Pressure vessel design

CORE SERVICES

Aquatec offers two main services under Aquatec Solutions:

Subsea Communication Solutions

- Subsea Optical Modems* for short range command and data download
- Acoustic Modems* for 'send and forget' or two-way communication

Design Services

- Instrument Design* - custom instrumentation for specific measurement requirements
- System Design* - combining existing or custom instrumentation with subsea/surface communication to solve a wide range of subsea measurement and communication problems

APPLICATIONS

- Riser monitoring • Hydrotest monitoring • Buoy presence monitoring • Permanent leak detection systems
- Pipeline temperature monitoring • Vibration monitoring • Water quality monitoring (ambient/injected)
- Noise monitoring • Custom marine mammal deterrents • Cable motion monitoring
- Acoustic data transfer solutions • AUV integration • Real time monitoring systems

- Dredge monitoring • Hydropower intake monitoring

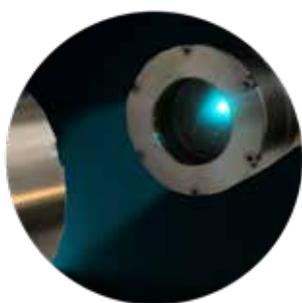


Subsea Communication Solutions

Aquatec offers communication solutions based on two data transmission methods, optics and acoustics, building on over 20 years experience in subsea modem design.

OPTICS

The AQUAmodem Op2 optical modem was developed for short range communication and provides a seamless interface between the user and any subsea instrumentation with RS232 serial interfaces, such as our AQUAlogger oceanographic instruments and HYDROlog hydrotest loggers – typically via an ROV umbilical.

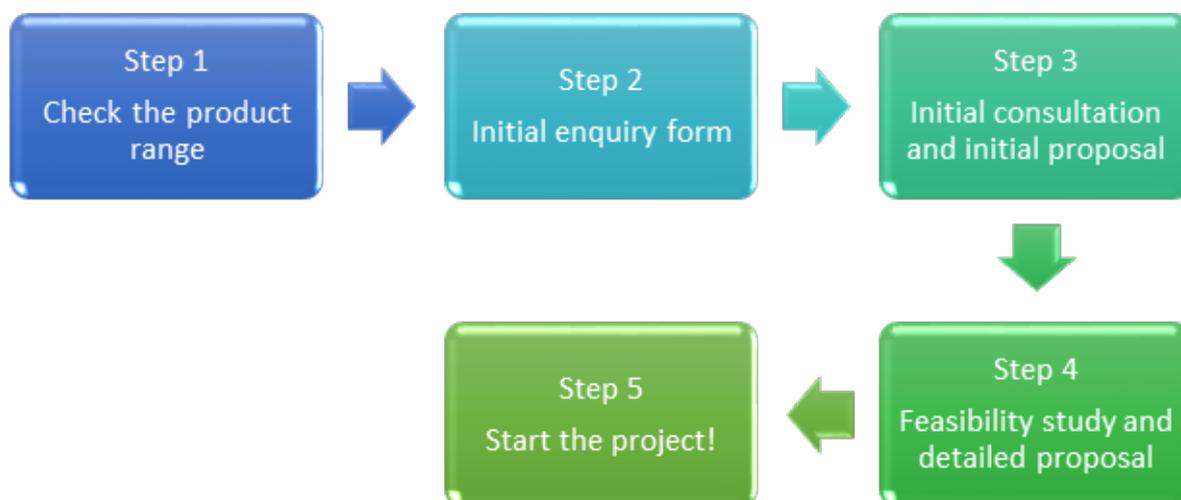


The AQUAmodem Op2 features individual unit addressing and automatic optical or serial data wake-up, to conserve the life of the external battery pack and prolong the service of the device. The instrument permits short range interrogation, commanding, and data download for your subsea monitoring equipment, providing you with a cost-effective and efficient solution to solve your subsea communication needs.

It is available as a standard product, but can be customised for specific data transfer requirements and applications, e.g. station keeping AUVs or other subsea vehicles.

ACOUSTICS

Subsea acoustic data transmission is a powerful tool, improving efficiency, availability of data and reducing the need for underwater intervention. However, the transmission of acoustic signals subsea is complex and dependent on a variety of environmental factors, including water column structure, bubbles and noise. As a result, Aquatec acoustic modems are not available as off the shelf products. Instead, we work with you to ensure communication success, using our 5 step process.



AQUAmodem RANGE

AQUAmodem S500—Integrated measurement and data acquisition

The AQUAmodem S500 instruments represent a breakthrough in low cost underwater communications. Perfect for long-term, multi-point monitoring, the system combines the proven data acquisition capabilities of Aquatec's AQUAlogger underwater instrumentation with a low-power acoustic transmission system. At the surface is a standard AQUAmodem receiver unit that decodes the data signals transmitted from multiple subsea units.



The modems offer low cost, “send and forget” data transmission that is ideally suited to transmitting very low bandwidth data – often a single data value – at regular intervals. Up to 64 uniquely identified transmitters can be distributed around a given subsea environment. Typical AQUAmodem S500 transmitters include sensors and data acquisition components to suit a particular distributed instrumentation requirement. Each unit acquires and transmits its data at preset regular intervals, with carefully controlled timing to minimise data collisions. Transmission rate can be made dependent upon the acquired value – for example increasing the data update rate in the event of a threshold being exceeded. A single acoustic receiver picks up all the data transmissions and either displays the results or passes them on to other systems via radio, satellite, GSM, or wired digital or analogue methods.

Sensors that can be easily integrated include pressure, temperature, turbidity, tilt and strain, although this list is not exhaustive.

Battery life exceeding 5 years can be achieved in a small form factor.



AQUAmodem 500—‘Send and forget’ data transfer

The AQUAmodem 500 range allows easy integration with both Aquatec and third party measurement instrumentation, permitting the addition of acoustic modems to existing and planned instrumentation. Suitable for a wide range of applications, modems can be customised for your specific project requirements.

The AQUAmodem 500 instruments offer “send and forget” data transmission that is ideally suited to transmitting very low bandwidth data. Each unit transmits its data, with carefully controlled timing to minimise data collisions. A single acoustic receiver picks up all the data transmissions and either displays the results or passes them on to other systems via radio, satellite, GSM, or wired digital or analogue methods.

CASE STUDY: real time pipeline temperature monitoring using the AQUAmodem 500

This AQUAmodem 500 instrumentation set was developed specifically for a new pipe spool installation in South East Asia, where knowledge of two subsea pipeline temperatures was required in real-time for flow assurance monitoring. Precision temperature sensors integrated into the acoustic transmission module were isolated from the surrounding water by the custom insulated mounting saddles.



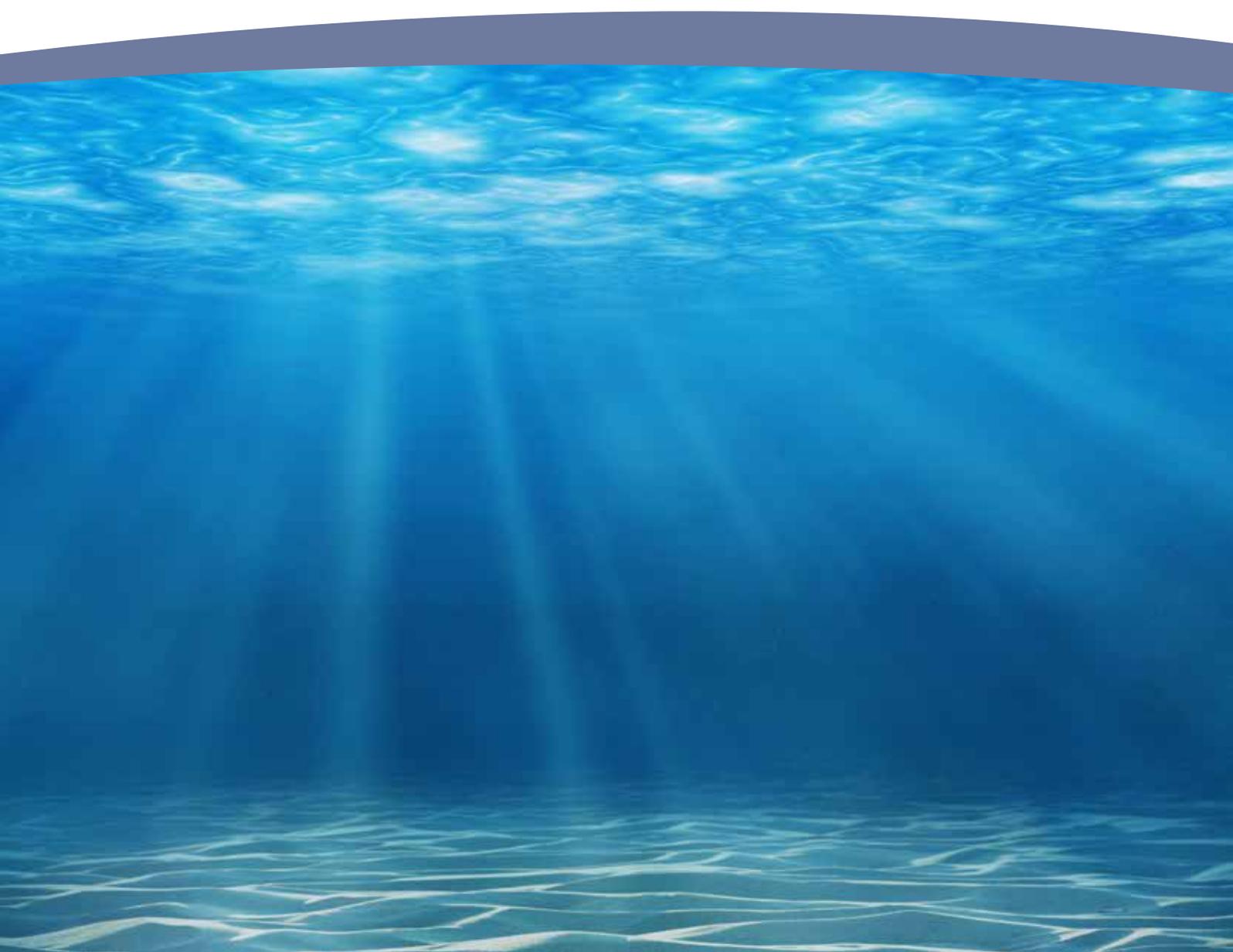
AQUAmodem 1000 configurable modem

The AQUAmodem 1000 is a fully bi-directional communication system, with capability to transmit up to 10 km in its long-range configuration. It is not available as a stand-alone instrument, but provided as a component in custom engineered solutions, and is tailored to customer specific applications to optimise performance.

The modem provides a bi-directional command and data telemetry link, capable of sending and receiving commands, and communicating data over long range and in deep water. This system allows up to 16 uniquely identified transceivers to initiate or receive command and data transmissions.

The transceivers include a substantial data storage capability, so that attached equipment can pass data to them in a 'store and forward' mode, for onward transmission when a transmission channel is available. The data can also be recovered later when the modem is retrieved.

With a flexible command and data architecture, including data validation and automatic retransmission requesting, the system can be configured to suit many different commanding, data acquisition and data transmission applications.



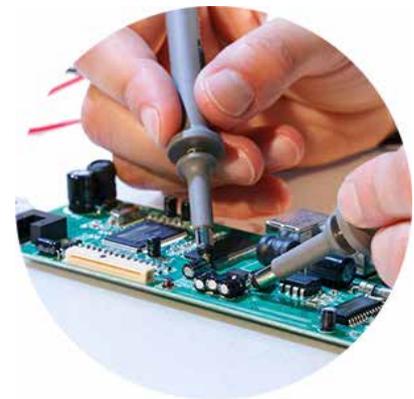
Design Services

Instrument design

Aquatec has been developing and manufacturing subsea instrumentation since 1990, and has a well-established and diverse range of products. Building upon this knowledge and product base, Aquatec offers an instrument design service for those requiring project / application specific instruments or new instrumentation that is not available as an 'off-the-shelf' product.

Aquatec designs subsea instrumentation to measure a variety of parameters for a wide range of applications, incorporating third party sensors, data logging, custom electronics and housing design. Every project is different, with different aims and end requirements for data. Aquatec will find the best solution to achieve your goal, working closely with you throughout the project.

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



PARAMETERS

Aquatec can design instruments to measure a variety of different parameters - examples are shown below. If the measurement you require is not listed, contact us and we will investigate the options for you.

Structures, cables, pipelines

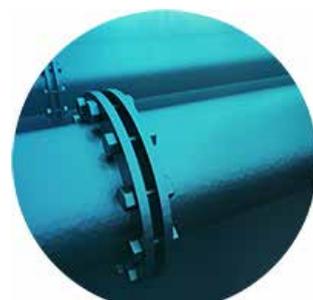
Motion, Tension
Pipeline pressure, Temperature
Leak Detection
Flow
Load

Water quality (seawater, injected water)

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

Hydrodynamics

Waves, Tide
Water level, Currents



EXPERTISE

Aquatec has an extensive range of products, developed through ongoing internal R&D, including:

HYDROlog range - Hydrotest pressure and water temperature

AQUAlogger range - Temperature, pressure and turbidity loggers

AQUAscat range - Acoustic suspended sediment profilers

LEAKlog range - Fluorescent, thermal and acoustic leak detection

Displays and gauges - Subsea displays and high precision gauges



CASE STUDY: AQUAlogger 530

Aquatec was required to design and manufacture a new temperature and depth logger for use on commercial fishing vessels. Near-real time data transfer, autonomy and robust design were all key requirements.

Background

Long term seabed temperature records in Northeast US coastal waters have traditionally been gathered by casts from research vessels costing up to US\$10-20,000 per day. Although this has yielded almost a century of observations, temporal resolution is poor, with measurements only taken a few times a year. From 2001, temperature and depth loggers were attached to some of the millions of lobster traps deployed by fisherman in the region. This increased the spatial and temporal resolution of temperature measurements, but data recovery was lengthy and delayed. A new temperature and depth recorder was commissioned to deliver data to fishermen immediately as the fishing gear surfaced, allowing near real time data transfer to NOAA – the AQUAlogger 530WTD.

Instrument

The AQUAlogger 530 is a standalone temperature and depth logger. The innovative design includes the ability to store data and display graphs automatically via wireless technology, negating the need for a cabled connection or manual interaction.

The system consists of a data logger and a reader unit. The logger can be triggered to start and stop collecting data at set depths or times. When retrieved from the water, the logger will automatically transmit the collected data to the reader wirelessly, provided there is line of sight and the reader is less than 100m away. The data will then be processed and a graph presented on the connected computer. The process from the start of data transfer to presentation of the graph takes minutes.

As the instrument was designed for use of commercial vessels, it is durable and has been shock tested to US standards, It can be attached to lobster pots, nets and other equipment. Providing there is line of sight with the reader, the logger may not need to be detached to download the data.



Design Services

System design

Aquatec's strength lies in our ability to produce custom engineered solutions to diverse subsea measurement and communication problems.

Using the core Aquatec technologies of logging, acoustics and subsea communication, we design and supply systems to meet your particular requirements. Through communication and consultation, we work with you to find the optimum solution to meet your measurement and communication needs, selecting our own instrumentation when design cycles need to be rapid, or integrating instruments from many third party instrumentation providers when appropriate.

In-house technologies such as data loggers, displays, acoustic modems, optical modems, switches, and clamps provide the building blocks for our bespoke systems.



INSTRUMENTATION

Aquatec designs subsea instrumentation to measure a variety of parameters for a wide range of applications, incorporating third party sensors, data logging, custom electronics and housing design as required.

INTEGRATED COMMUNICATION

Aquatec first launched a subsea communication system in 1997 - the first acoustic AQUAmodem. Since then, we have developed three AQUAmodem technologies that we integrate into custom engineered solutions for subsea monitoring. In addition, we provide advice and assistance on the best communication methods for your project.



DISPLAY

In 2015, Aquatec launched the AQUAdisp™ - a revolutionary new subsea display, designed to offer a compact and low power alternative to other comparable instruments. The AQUAdisp can monitor up to 16 parameters and display them over 4 screens. Data can also be presented graphically (on 16 graphs), with options for individual readings or averages to be displayed. The low power technology means there is no need to turn it on or off, but if this is required, both light activation and a magnetic switch can be used.



APPLICATIONS

	Vessels , Floaters & TLPs	Structures	Subsea Production	Pipe/Flowlines	Risers	Cables	Moorings	
Position	•				•		•	
Heading	•							
Motion	•	•	•	•	•	•		
Acceleration					•	•		
Vibration		•	•	•	•			
Temperature			•	•	•			
Pressure			•	•	•			
Tension / load	•	•					•	
Stress	•	•		•				
Water quality			•	•	•			
Leaks			•	•	•			
Cathodic protection	•	•	•	•				

CASE STUDIES

Cable motion monitoring

High speed, multi-axis monitoring of power export cable motion on an offshore wind farm, including integration of acoustic monitoring of waves and currents, and real-time networking back to shore.



Injected water quality monitoring

The sensor and integrated system above was developed to monitor the particulate content in a subsea water injection system. The equipment includes a subsea data logger, ROV-readable display, flange-mounted particle sensor, rechargeable battery pack, and cable harness, all rated for 3000m water depth.

Fully integrated hydrotest monitoring system

The system incorporates HYDROlog hydrotest data loggers, AQUAmodem Op1 optical through-water communications link, AQUAswitch ROV-operable underwater switch, subsea display, rechargeable battery pack, and a variety of custom cable assemblies for a complete hydrotest monitoring skid.





Aquatec Solutions

Aquatec Group Limited
Aquatec House, Stroudley Road, Basingstoke, RG24 8FW, UK
www.aquatecgroup.com
inquiry@aquatecgroup.com

Tel: +44 (0) 1256 416010
Fax: +44 (0) 1256 416019

Document copyright © 2018 Aquatec Group. ASB-Mar18v1.
Aquatec Group Ltd. Registered in England & Wales No 2523284