



MMF 52

Hydrotest Monitoring: Adapting Oceanographic Instrumentation to Subsea Pipeline Testing

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Managing Director

Overview

- Aquatec Group Ltd
- What is Hydrotesting?
- From Oceanographic to Industrial: 1
- Cost Drivers
- From Oceanographic to Industrial: 2
- When A Hydrotest Fails...

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Aquatec Group Ltd

Creators of innovative *INSTRUMENTS*, *SERVICES*,
and *SOLUTIONS* for your *MEASUREMENT*,
MONITORING, and *COMMUNICATION* needs
UNDERWATER

*Providing instrumentation solutions for all water
environments including:*

Offshore Energy & Marine Renewables

Ocean Science

Fisheries and Marine Wildlife

Customers in the offshore market



Aquatec Group Ltd

- Founded in 1990
- Based in Hampshire, UK
- Primary expertise:
 - Subsea instrumentation: to 4000m & beyond
 - Long life autonomous systems: 10+ years design life
 - Underwater acoustics and optics
- Design and manufacture all products and engineered solutions
- Products sold worldwide: >75% export
- ISO 9001:2008

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What is Hydrotesting?

- Hydrostatic Pressure Testing
- Carried out in the 'Pre-Commissioning' phase of newly installed subsea pressure vessels:
 - Pipelines
 - Subsea manifolds
 - Risers
 - Flowlines
- After installation, subsea pressure vessel is:
 - Flooded with seawater
 - Pumped to an internal test pressure
 - Sealed off for between 6 and 48 hours

What is Hydrotesting?

- Pressure must remain steady during hold period
- A successful pressure hold signals the sign off for the subsea installer
- Standards & requirements
 - DNV, ANSI, API
 - Require measurement of pressure AND temperature
 - ‘Continuous pressure record’
- Temperature is measured to identify pressure variations caused by environmental changes during test

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AQUAlogger 520

- **AQUAlogger** : self recording, multi-channel data logging instruments, usually incorporating sensors
- **520 series**: Key characteristics are
 - Connectorless communication via custom USB reader
 - Large data storage memory
 - Versatile programming
- **520PT Instruments**: Measure Temperature & Pressure
 - -2°C to +30°C Standard, other ranges possible
 - 1.6 (6m) to 100 bar (1000m)
 - Used for water level, tide, or depth



Product Application

- From Oceanographic...

- AQUAlogger 520 PT



... with the addition of a pressure connector & higher range pressure sensor

- To Industrial...

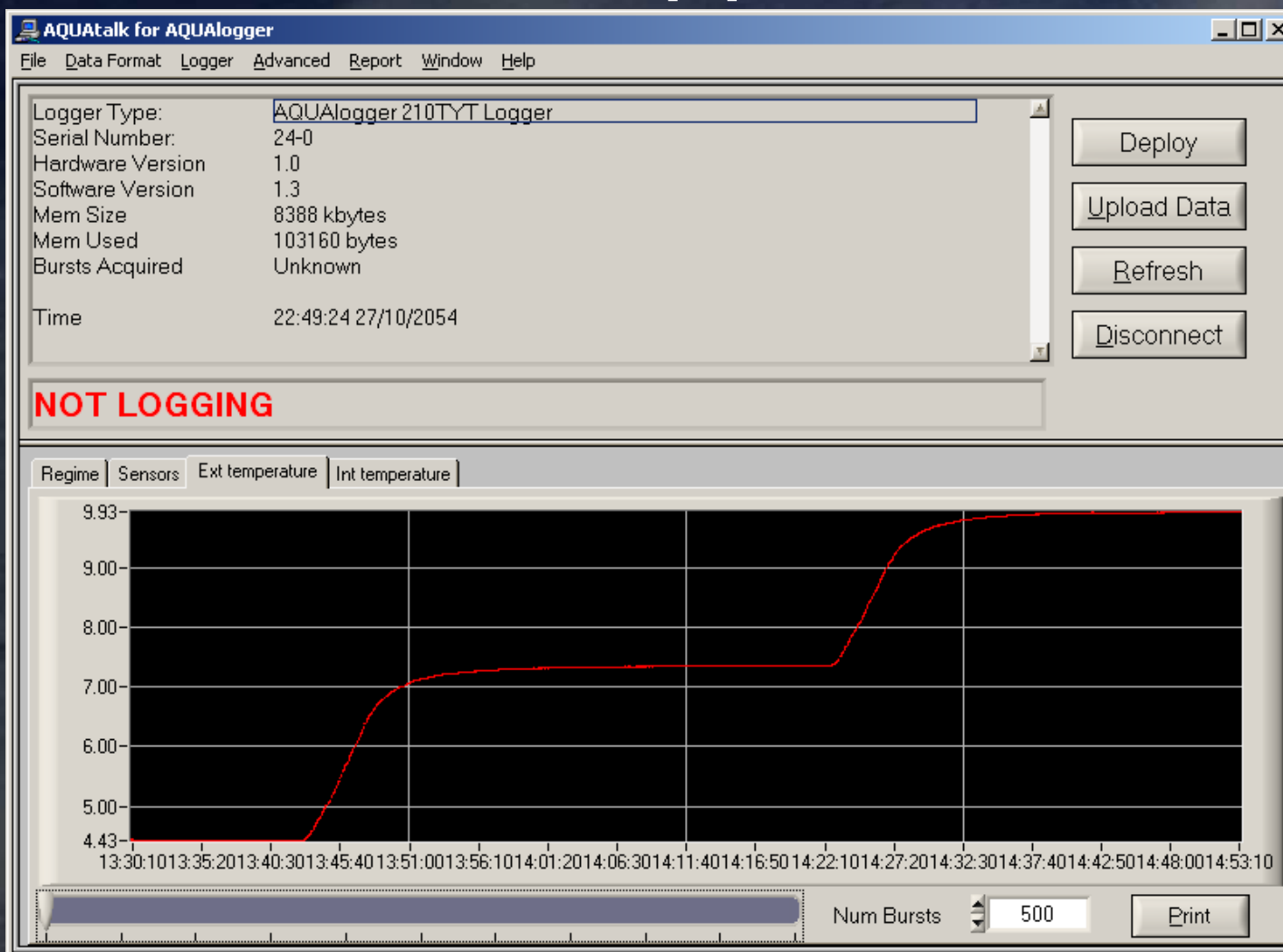
- HYDROlog 1100

- Up to 600 bar

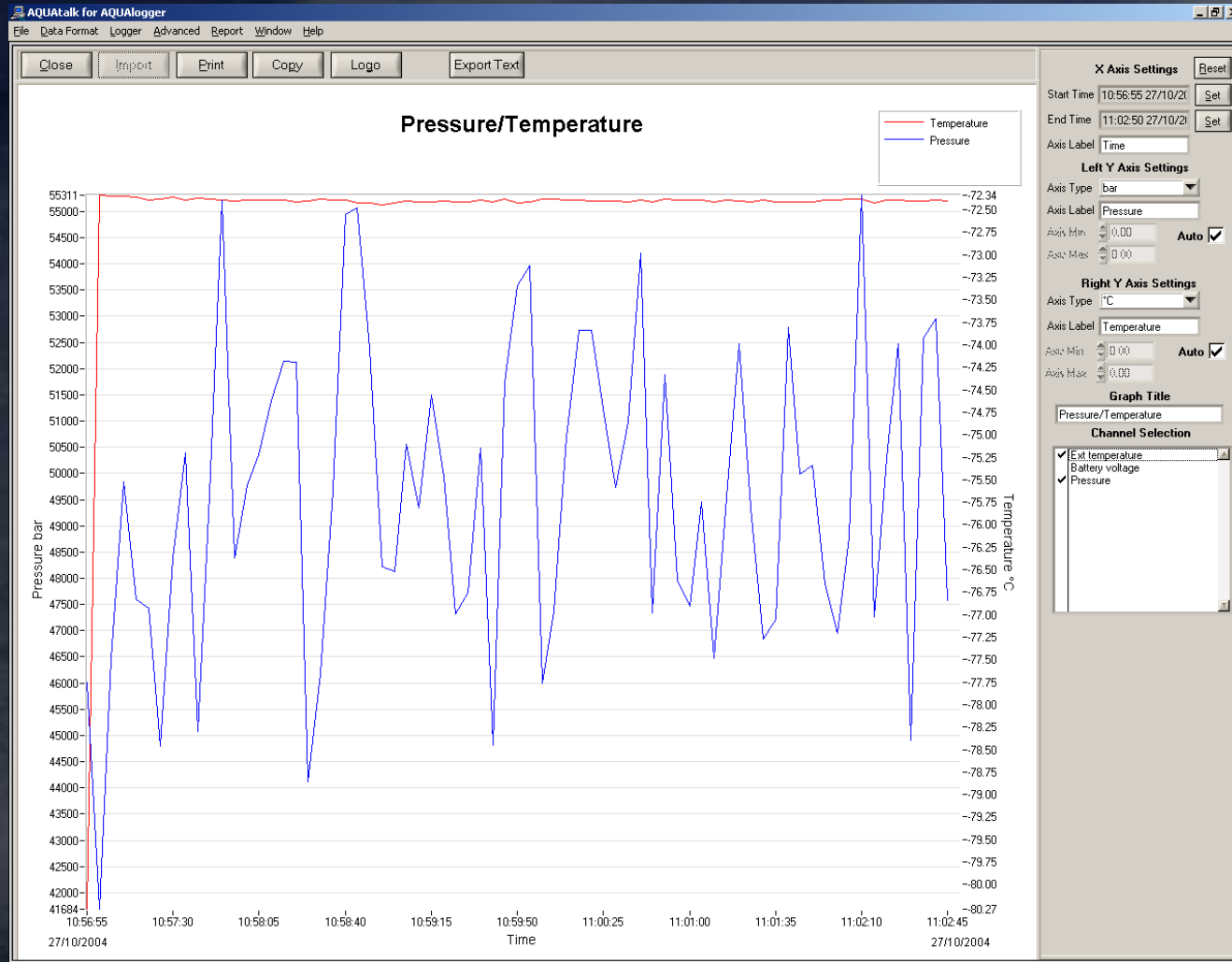


- A hydraulic hose links the pipeline under test to the data logger

Product Application



Product Application



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How to Reduce Cost?

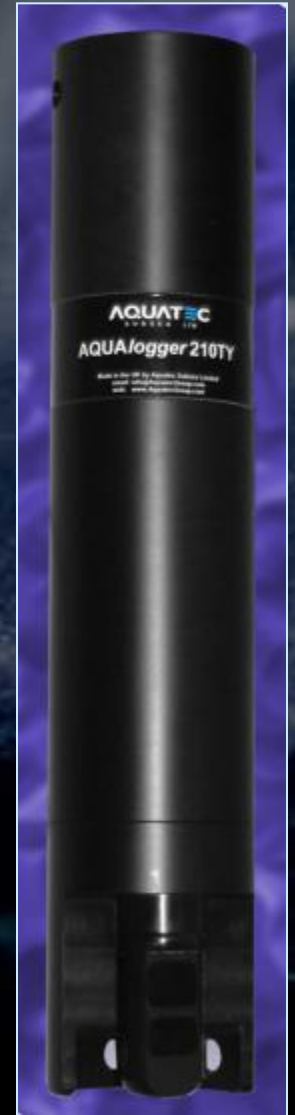
- A dynamically positioned diving support vessel can cost £100-200k per day
- Time = Money!
- Time is wasted if a hydrotest failure due to a leak is not detected until the end of the test
- ROV dive and surface rates mean deep water return transits can take hours
- Time is wasted recovering the logger to the surface
- The solution: Real-Time Data

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AQUAlogger 210PT

- **AQUAlogger** : self recording, multi-channel data logging instruments, usually incorporating sensors
- **210 series**: Key characteristics are
 - RS232 and USB communication via waterproof connector
 - Large data storage memory
 - Versatile programming
 - Real-Time Data Output
- **210PT Instrument**: Also measure Temperature & Pressure:
 - -2°C to +30°C Standard, other ranges possible
 - 1.6 (6m) to 100 bar (1000m)
 - Used for water level, tide, or depth



Product Application

- From Oceanographic...

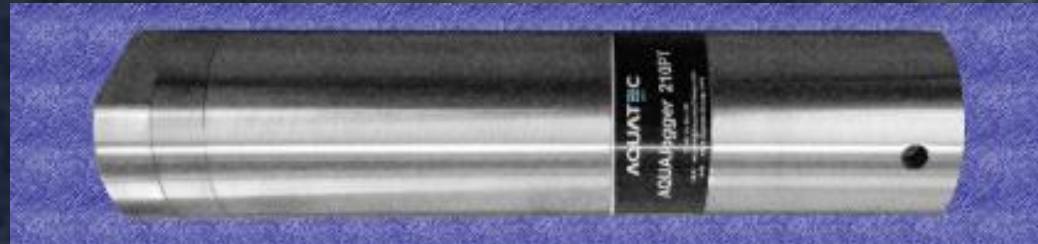
- AQUAlogger 210 PT

... with the addition of a pressure connector & higher range pressure sensor

- To Industrial...

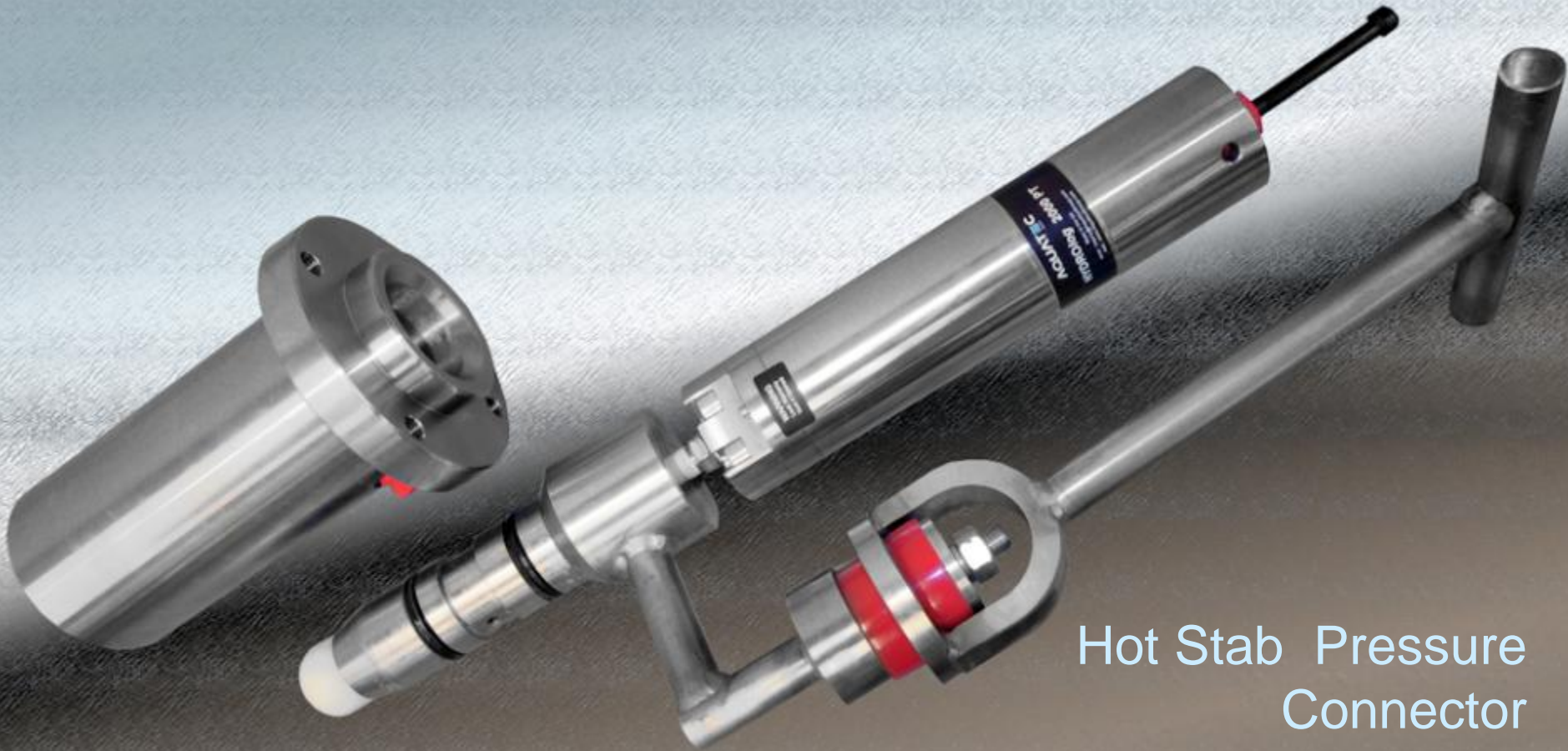
- HYDROlog 2000

- Up to 1400 bar



- A hydraulic hose can link the pipeline under test to the data logger, or...

Product Application



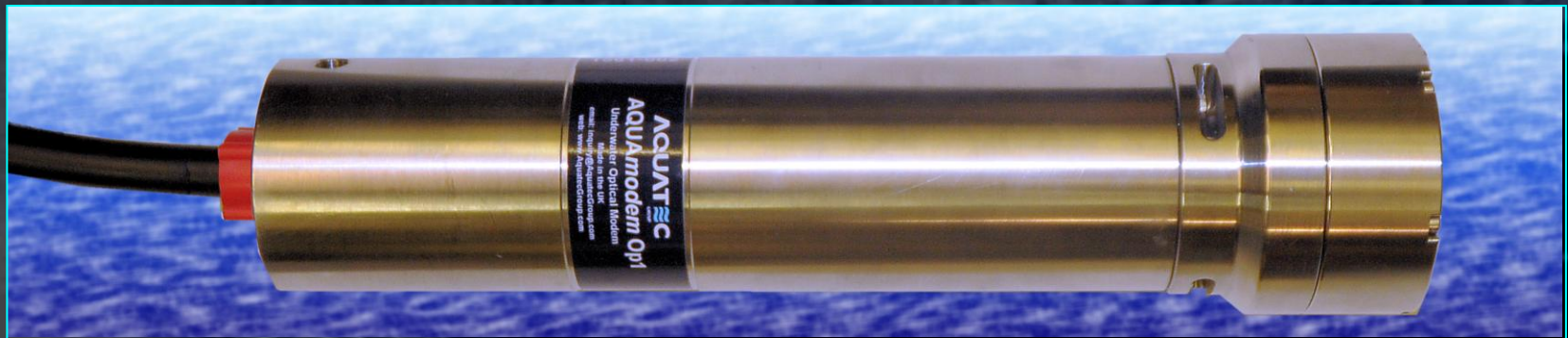
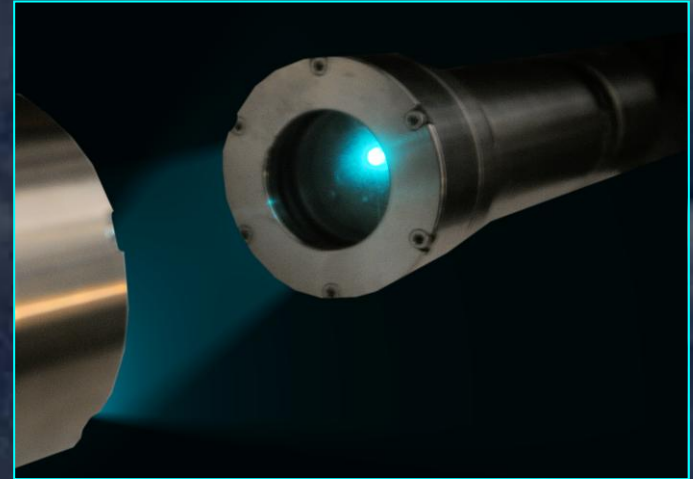
Hot Stab Pressure Connector

Instantaneous Real-Time Values



Real-Time Test Data Upload

- Optical Communications
- Seamless interface between subsea instruments & surface operator
- Transparent RS232 communication link



Complete Systems



Complete Systems



Remote Pressure Indication



Hydrotest

- leak detection
- pressure monitoring

Subsea Monitoring & Telemetry

- temperature
- pressure
- vibration
- CP monitoring
- data telemetry

Leak Detection

- fluorescent
- acoustic
- thermal

HYDROlog

AQUAmodem

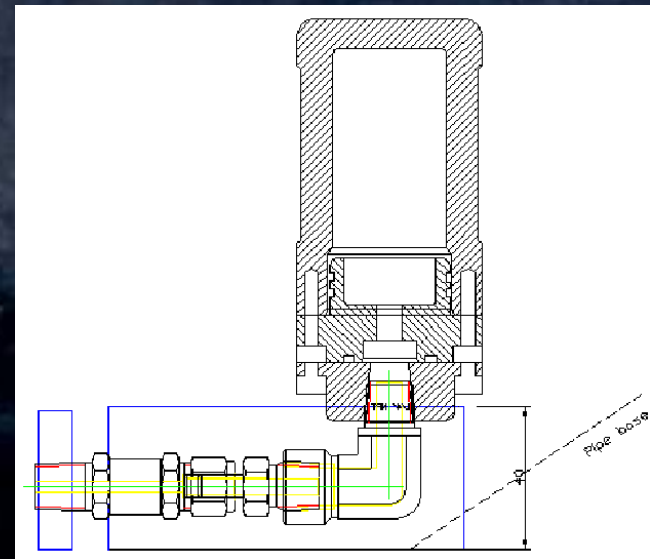
AQUAlogger

LEAKlog



Real-Time Acoustic Transfer

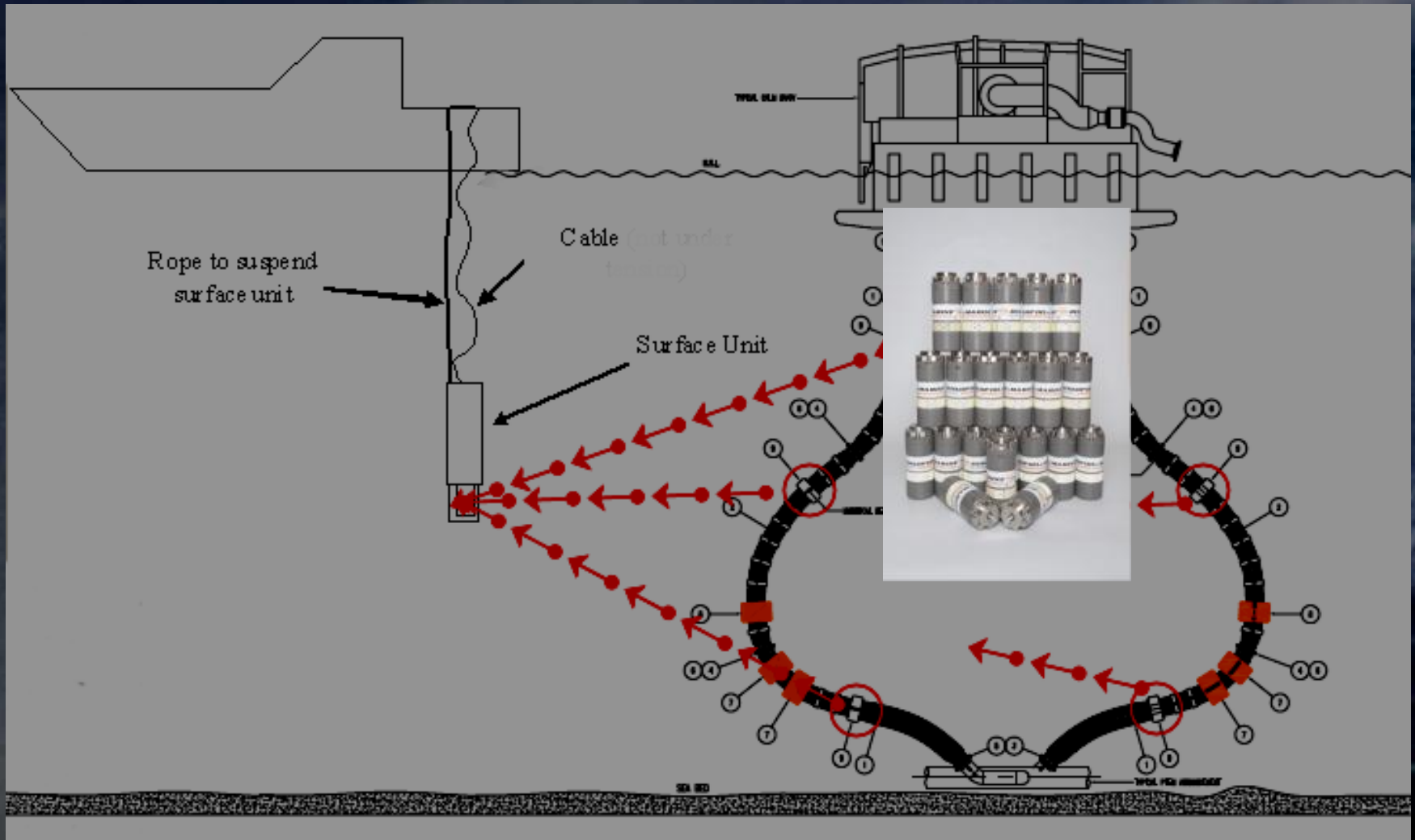
- Pressure telemetry system
 - Integral pressure transducer
 - Measures pressure and transmits as acoustic signal
 - Signal received and decoded at surface



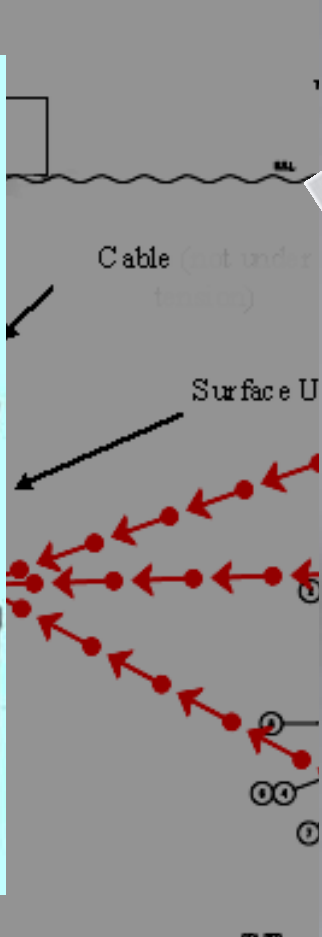
Acoustics

- ‘Send and forget’ principle
- Update every n minutes
- Message collision avoidance:
 - Two transmissions every update period
 - Separated by random interval
- Message includes error checking and correction
- Decoding includes multiple validation stages to minimise false alarms

Theory of Operation



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Subsea Leak Detection

- Integrated systems for sensing leaks
- ROV-deployed or stand-alone with acoustic data transfer options
- Range of sensors:
 - Passive acoustic
 - Temperature
 - Fluorescence





Hydrotest

- leak detection
- pressure monitoring

Subsea Monitoring & Telemetry

- temperature
- pressure
- vibration
- CP monitoring
- data telemetry

Leak Detection

- fluorescent
- acoustic
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Any Questions?



HYDROlog

AQUAmodem

AQUAlogger

LEAKlog

Aquatec provides subsea data acquisition solutions through the design and manufacture of standard and custom instrumentation for subsea process and condition monitoring, including through water data transmission to retrieve remote data.

www.AquatecGroup.com