

## Subsea Electrical Test System (SETS)

IMES has developed a subsea deployable testing and instrumentation system to allow testing of electrical subsea umbilicals and structures. The SETS unit was developed in response to demands for a tool to test for Insulation Resistance (IR) and Continuity Resistance (CR) in the oilfields West of Shetland.



When a subsea electrical fault such as Low Insulation Resistance (Low IR) occurs in electrical connections and umbilicals, it is difficult to locate from the surface when it occurs in deepwater or complex field architecture, pinpointing the exact location with the surface mounted instrumentation is even more complex.

The SETS unit can be mounted on various Remote Operated Vehicles (ROVs) and are all remotely controlled from the surface where individual cores can be tested with all results being recorded in real time in front of the operator.

Recent developments have included expansion of the technology to include Time Domain Reflectometry (TDR).

### Applications include:

- Integrity assessment during commissioning and lay operation
- Post lay electrical testing
- Fault-finding diagnostics
- Schedule maintenance program

IMES SETS equipment electrically tests the integrity of subsea power and control umbilicals at source either during commissioning, field base-lining or as a maintenance and fault finding tool on existing fields.



Deployed by an ROV to a variety of depths the test POD is fully controllable from the surface with live information transmitted from the test back to the Surface Control Unit (SCU) and Data Acquisition (DAQ).

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Our SETS systems work in depths of up to 3,000m and can test a 50km subsea umbilical and pinpoint a fault with an accuracy of c. +/- 0.2% of range. It has full remote control: including onscreen instrument setup.

SETS components are:

**SCU** – The SCU controls which electrical lines will be tested by the SMG

**SMG** – Subsea Unit which houses the systems' Insulation Tester

**DAQ** - Data Acquisition Laptop. The DAQ uses software to control which test type will be conducted and to record the test data.

SETS uses the ROV's own multiplexed communications lines for its control and data transmission. SETS is portable for easy and quick mobilisation and demobilisation, requiring minimal space in the ROV Control Room to set up SCU and DAQ units and deliver a suite of subsea umbilical tests. The SCU unit is completely self-contained in a carry case and is powered simply via a mains power supply of 95-265vac 50/60 Hz. The DAQ is a ruggedised Laptop PC which uses Insulation Tester control software to record and analyse test data.

### Benefits to Clients:

IMES SETS equipment is part of a suite of integrity management tools for the offshore and subsea environment. IMES technology has been proven over and over with many successful campaigns.

SETS allows for each element of the subsea architecture to be isolated and tested individually and the fault(s) located rapidly, effectively reducing commissioning, post install test and fault finding exercises.



The Insulation and Continuity test machine housed in the SMG pod operates the same way as a conventional test machine, in that it has a Positive and Negative terminal that must be connected to the electrical line(s) to be tested. For this reason the SCU has selection switches for connecting electrical lines to either the Positive and Negative terminals of the insulation tester.

Hard and soft interlock systems provide security ensuring that incorrect tests and or voltages cannot be applied.

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### Technical Specifications:

- ROV Deployed, surface controlled
- 2000 MSW rated (3000m option)
- IR and CR testing
- TDR option
- Live test control / live trending / live logging
- 100v to 5kV test ranges
- Power and communications and control
- Safety and Interlocking



### CLIENT TESTIMONIAL

*"I am happy to report that the IMES Subsea Electrical Test System worked even better than our initial hopes. We were not only able to complete the necessary testing in less than half the allotted time we were also able to have the results in a high resolution graphed format so that we can repeat the test annually for comparison data and track the aging of this system accurately. This was not a planned result but after seeing the system in action the maintenance engineers realized a new potential for the system not initially planned. Thank you to you and your team in the UK for all the hard work and making this a pleasant experience."*

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