

# VetcoGray Umbilical Monitoring Device (UMD)

Advanced early warning, detection and measurement of insulation leakage conditions

## Safety & cost management

The VetcoGray umbilical monitoring device (UMD) is specifically designed for subsea umbilicals tied back to floating systems. It connects to the closest point between the center tap of the subsea isolation transformer and the protective conductor.

With its combination of sophisticated hardware and advanced software algorithms, the UMD can detect a wide range of leakage conditions in the instillation of electrical umbilical cores. The device's high sensitivity is achieved through intelligent signal amplification, a precise online calibration service and DC offset detection and elimination.

Beyond detecting existing leaks, the UMD's advanced analysis capabilities take a crucial step forward – enabling early warning of a pending insulation failure.

## Flexible integration

The UMD features a system-friendly measuring signal that is controlled by pulse-width modulation (PWM) so that the signal frequency and pulse width can be varied to maximize application flexibility.

The processing power and data acquisition interface includes our versatile SemStar5™ single-board processing module, which offers the advantages of real-time operation and obsolescence management.

## Key features

- Insulation resistance measurement accuracy:
  - <5% error for umbilicals of 10 K $\Omega$  to 5 G $\Omega$
  - <20% error for umbilicals of 5 G $\Omega$  to 10 G $\Omega$
- Leakage capacitance measurement: 100 nF to 1  $\mu$ F
- Measures both insulation resistance and leakage capacitance
- Ethernet MODBUS TCP interface simplifies communications with topside monitoring equipment
- Data logging and trending of umbilical conditions
- Fully configurable alarm capabilities: standard communications interface and front panel LED alarms
- Capacity to trigger audible alarms at work station and isolate power
- SemStar5™ processing core for real-time operation and obsolescence management



## Design & performance

Similar to the safety device that measures resistance between umbilical cable cores and earth, the UMD performs line insulation monitoring (LIM) to identify breakdowns in insulation resistance (IR).

The UMD raises two alarms when IR falls below the desired thresholds – the parameters of which are easily configured using the unit's specialized PC-based software. When IR drops below L or LL thresholds, the corresponding UMD volt-free contact is opened and alarms signal both through the communications interface and with a visible LED indicator on the front panel. These relays can also be used to raise audible alarms in the operator work station or to isolate power to the primary of the subsea isolation transformer.

The device also has an online earth test circuit that warns if the unit is not adequately grounded. The device continuously measures insulation resistance by applying a DC signal (<50 V) in analog mode, and a pulsed DC signal in digital mode, to the umbilical respective to earth without affecting the subsea power or communications system.

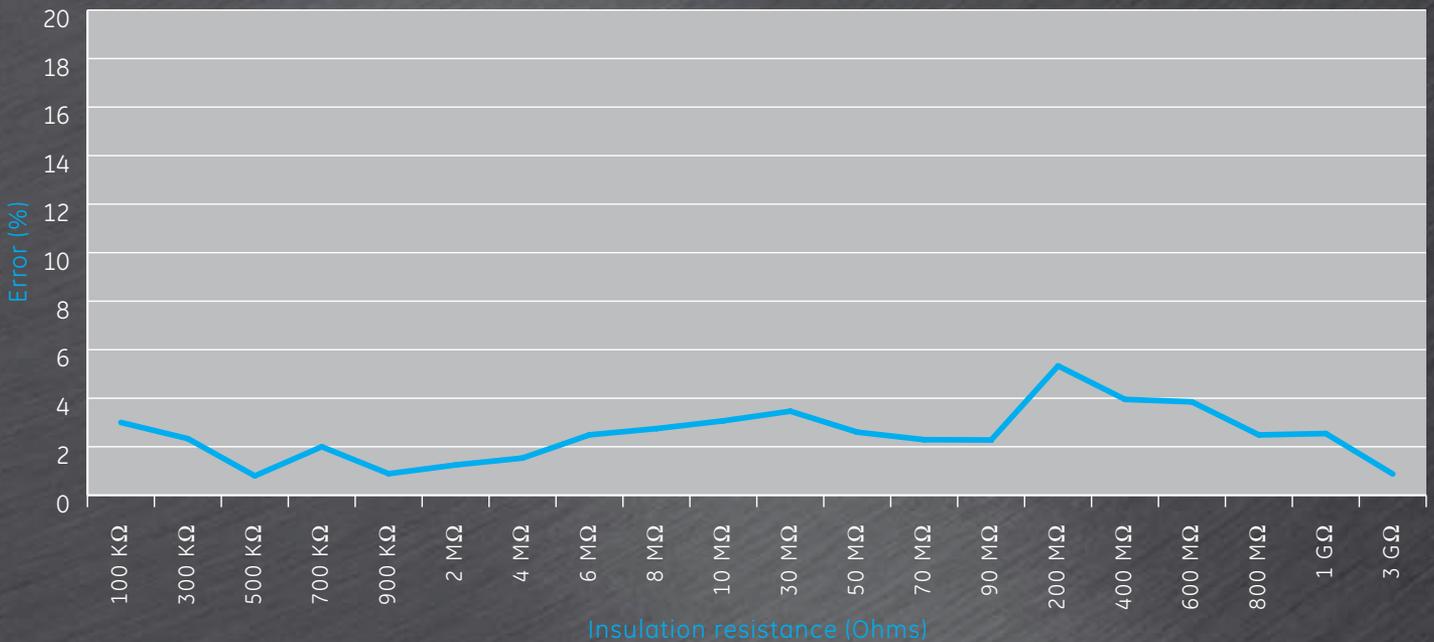
The UMD can actively function while connected to umbilicals powered up to 1,000 V AC at 50–60 Hz. An earth fault allows an earth leakage current to flow through the measuring circuit in order to calculate insulation resistance (IR) in analog mode, or IR and leakage capacitance (CL) in digital mode. Using such parameters, the UMD is able to calculate the exact condition of the umbilical system.

## Precise measurement capabilities

By measuring both insulation resistance and leakage capacitance, UMD accurately calculates the exact condition of the umbilical system, including environmental effects such as water ingress.

With current accuracy levels of over 95% for umbilicals up to 5 G $\Omega$ , our next generation system will reach even higher levels.

## UMD insulation resistance measurement accuracy (50 K $\Omega$ to 5 G $\Omega$ )



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GE imagination at work

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