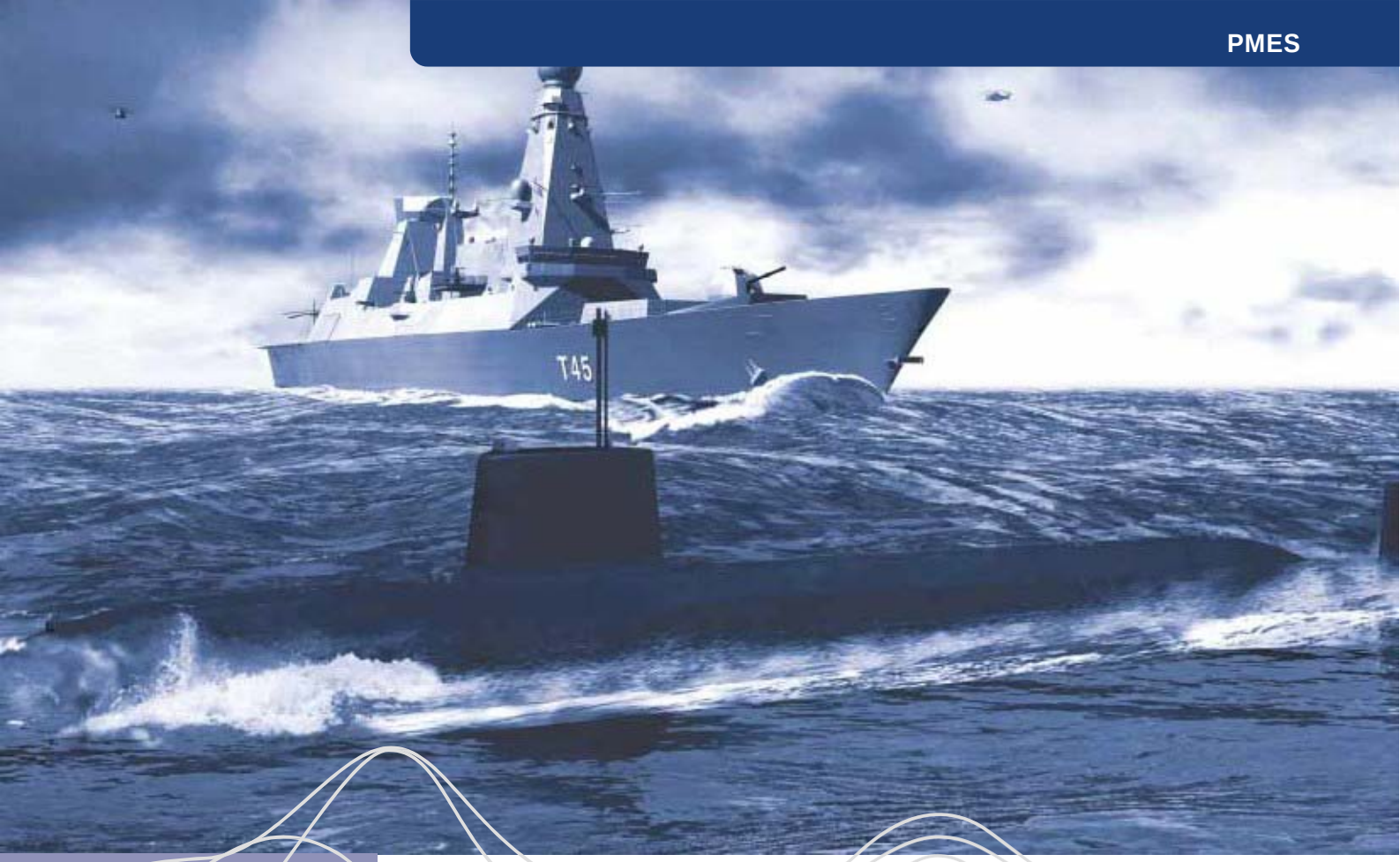

Underwater Electric Field Measurement

Individual Sensing Elements

Ultra Electronics Electric Field Sensors are used to measure electric fields in seawater with high precision. The technology utilises specially designed Silver / Silver chloride sensor elements and extremely low noise pre-amplifiers to achieve detection in the nV/m range. The very high performance is achieved due to the exceptionally low noise of the electrodes and pre-amplifiers.

The three pairs of electrodes are shown overleaf, together with matching pre-amplifiers and filters. This configuration is typical of a simple sensor arrangement suitable for OEM integration. Alternatively Ultra are able to offer complete stand alone electric field senor solutions and multi-influence sensor solutions that can measure magnetic, electric, acoustic and pressure influences.

- Geophysical measurements and prospecting
- Oceanographic studies
- Long range detection and surveillance
- Ship signature ranging and management
- Corrosion protection

Ultra ELECTRONICS

Sensor Specifications

Sensor type	Ag/AgCl
Package	cylindrical.
Package	Material Poly acetal
Overall length excluding penetrator (cover fitted)	165mm
Cable length	1.3m (other lengths upon request)
Diameter with cover fitted	70mm
Maximum working depth	4000m
Total Mass with cover fitted	700g
Electrical interface connector	Impulse VMF-1-fS
Operating temperature range	0°C to + 50°C
Storage temperature range	0°C to +70°C

Overall System Performance

Measurement channels	3
Power Supply	Vs = ±8V ±1V DC
Power Consumption	< 5W
Power up time	< 10 minutes
Dynamic input range (within pass band)	± 2.5mV
Bandwidth	DC to 3kHz (-3dB)
Roll off rate	6dB/octave (20dB/decade)
In band ripple	< ± 3dB
Output voltage swing	±5V min
Scale factor tolerance	±1.0%
Output type	Analogue Voltage
Equivalent input Noise at 1Hz	< 0.52 $nV^{-\frac{1}{2}}$

Examples of resolution for differing baselines

1m I/P noise = $0.5nV^{-1} = 0.5nV^{-\frac{1}{2}}m^{-\frac{1}{2}}$

5m I/P noise = $0.5nV^{-\frac{1}{2}} = 0.1nV^{-\frac{1}{2}}m^{-\frac{1}{2}}$

10m I/P noise = $0.5nV^{-\frac{1}{2}} = 0.05nV^{-\frac{1}{2}}m^{-1}$

Amplifier Specifications

Supply voltage	±8V
Supply current	75mA
Gain	2000
Gain tolerance	±1%
Output voltage swing	± 5V min
Input dynamic range	±2.5mV
Bandwidth DC	to 3kHz (-3db)
Output type	Analogue Voltage
Input noise	0.44nV $Hz^{-\frac{1}{2}}$ at 1HZ

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