

Cavity Profiling

Sonar Systems

Mk 2 directional probe being lowered into a salt cavity



The Mk2 probe is 100mm in diameter and has four rotating highly directional transducers driven by a powerful geared d.c. motor. The Mk2 probe is used to provide cross-sectional profile data of the cavity when the lining tubes have been withdrawn..

The Mk2 probe has four transducers mounted at angles to the horizontal of 0°, +45°, -45° and -90° which enables profiles to be taken even when near the roof or floor of the cavity. The transducers operate at 700kHz and have a narrow conical beam pattern. The transducer head is coupled via slip-rings so may freely rotate through 360°. Normally a sweep is taken every 1m in depth with 400 transmit/receive cycles (0.9° angular increments) per revolution. The time taken to gather the data for one sweep is range dependant but is typically only one minute at a 50m range. The -90° transducer acts as a multi-return echo sounder providing a scrolling height above cavity floor display as the probe is lowered.

The Mk2 probe has a built in Fluxgate compass which is linked into the head positioning software which then orientates the graphical display of the cavity cross-section relative to magnetic North.

The Mk2 probe connects to the Interface Unit in the same manner as the Mk1 probe and is also controlled by the CavProf software.



Marine Electronics currently manufacture two different types of cavity profiling sonar probes. Both probes are designed to meet the robust requirements needed for surveying fluid filled cavities and are rated at 1000m operational depth. The probes are constructed from 316 Stainless Steel, acrylic and polyurethane so that they are inert to a wide range of chemicals.

The Mk1 probe is only 50mm in diameter and has a fixed transducer with an omni-directional beam pattern in the horizontal plane and a narrow beamwidth in the vertical plane. The probe is used to obtain quantitative measurements about an underground cavities minimum and maximum dimensions as it is lowered through the cavity, usually taking readings every metre. Built in Tilt, Pressure and Temperature sensors provide additional data.

The Mk1 probe is designed to operate through the metal lining tubes of the cavity. To optimise the acoustic signal for variations in the number of lining tubes and their condition the operating frequency of the probe is tunable and the transmit power variable. For each depth at which readings are taken the probe produces a number of echo returns from around the cavity which are grouped into amplitude bands and plotted against range to indicate the boundaries of the cavity.

The Mk1 probe connects to a dedicated interface unit which provides the d.c. power and telemetry interface via a 4 core steel armoured logging cable. The interface unit is controlled by a Windows P.C. (may be a notebook) running the CavProf software via an RS232 serial link.

Features Include:

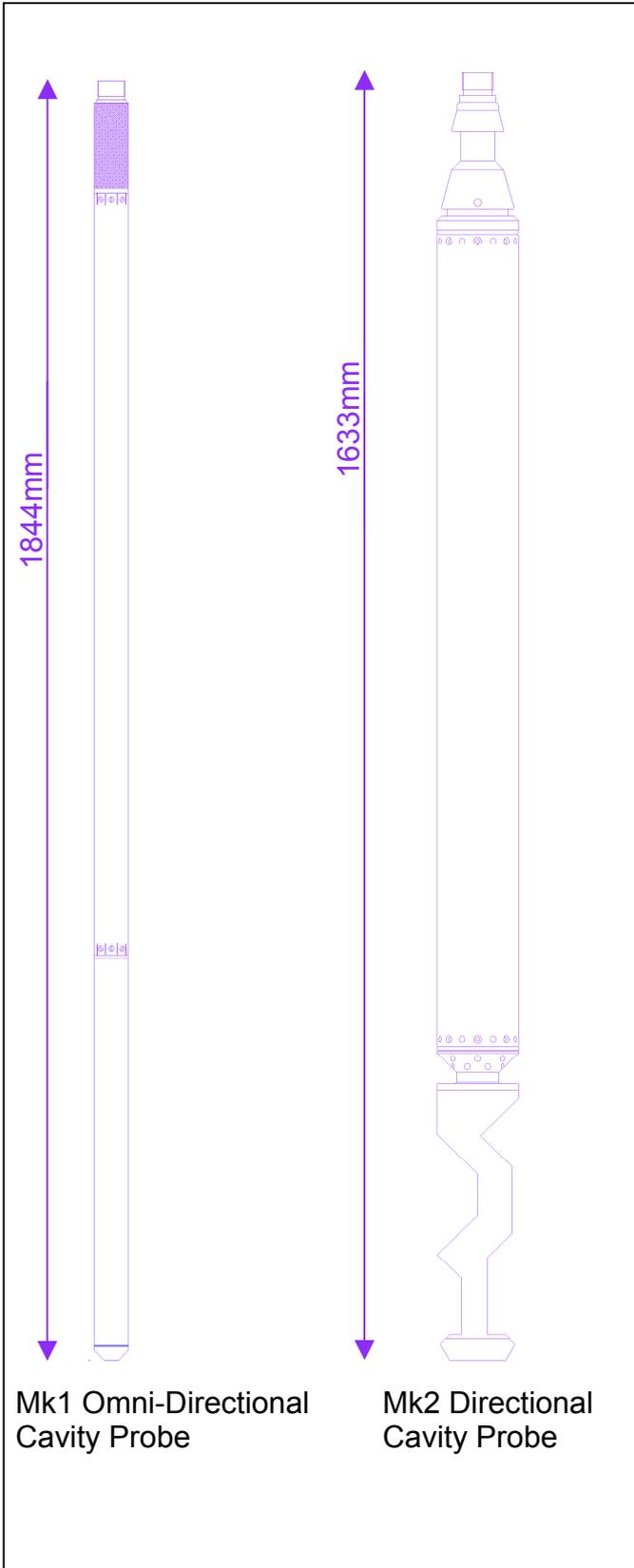
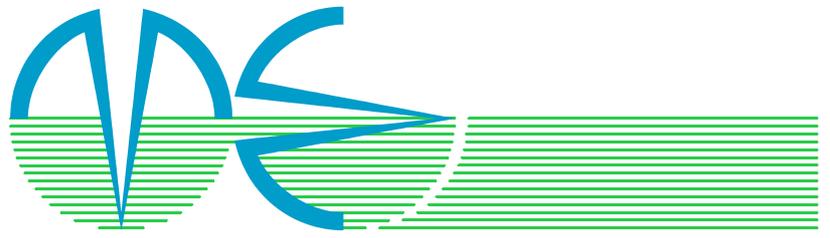
- **Rugged down-hole probes**
- **Directional or omni-directional beam patterns**
- **Surveying through lining tubes**
- **Robust 1000m digital telemetry**
- **High resolution colour display**
- **Dual tracking cursor for on-screen measurements**
- **Saving and restoring of raw data at full resolution**
- **Winch interface for automatic logging with depth**
- **Data download for external processing**



Marine Electronics Ltd.,
Unit 10,
Barras Lane Industrial Estate,
Vale, Guernsey, C.I.
GY6 8EQ
Tel: +44 (0)1481 253181
Fax: +44 (0)1481 253182
Email: sales@marine-electronics.co.uk
Web: www.marine-electronics.co.uk

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Mk1 Omni-Directional Cavity Probe

Mk2 Directional Cavity Probe

Mk1 Omni-Directional Cavity Probe

<i>Dimensions:</i>	Length: 1844mm
	Diameter: 50mm
<i>Weight:</i>	20kg
<i>Material:</i>	316 Stainless Steel and Acrylic
<i>Temperature:</i>	Operating: 0°C to +40°C Storage: -20°C to +65°C
<i>Operating Depth:</i>	1000m
<i>Operating Frequency:</i>	Variable 28kHz to 41.5kHz
<i>Transducer:</i>	Cylindrical in oil filled pressure balanced Acrylic housing
<i>Vertical Beamwidth:</i>	7° at 33kHz and VoS 1800m/s
<i>Horizontal Beamwidth:</i>	360°
<i>Transmit Pulse Length:</i>	Variable 100µsec to 2msec
<i>Transmit Power:</i>	Variable up to 400W
<i>Receiver Gain:</i>	Variable with 16 levels
<i>Pressure Transducer:</i>	0 to 100Bar
<i>Temperature Sensor:</i>	-20°C to +80°C
<i>Tilt Sensors:</i>	Dual Axis +/-20°
<i>Power Supply:</i>	+/-40v DC at 250mA
<i>Cable Requirements:</i>	4 core + armoured screen

Mk2 Directional Cavity Probe

<i>Dimensions:</i>	Length: 1633mm
	Diameter: 100mm
<i>Weight:</i>	35kg
<i>Material:</i>	316 Stainless Steel and Polyurethane
<i>Temperature:</i>	Operating: 0°C to +40°C Storage: -20°C to +65°C
<i>Operating Depth:</i>	1000m
<i>Operating Frequency:</i>	700kHz
<i>Transducer:</i>	4 off discs at -90°, -45°, 0°, +45°
<i>Beamwidth:</i>	1.8° (+/- 3dB full angle)
<i>Transmit Pulse Length:</i>	Variable 100µsec to 2msec
<i>Receiver Gain:</i>	Variable with 16 levels
<i>Power Supply:</i>	55v DC at 1A
<i>Cable Requirements:</i>	4 core + armoured screen



Marine Electronics Ltd.,
Unit 10,
Barras Lane Industrial Estate,
Vale, Guernsey, C.I.
GY6 8EQ
Tel: +44 (0)1481 253181
Fax: +44 (0)1481 253182
Email: sales@marine-electronics.co.uk
Web: www.marine-electronics.co.uk
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