

Hydrophone product selector



Precision Acoustics Ltd are pleased to offer a wide range of hydrophones. This document introduces all the different hydrophone types and provides a summary of the benefits that each hydrophone model offers.

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MEMBRANE HYDROPHONES

Membrane hydrophones are the gold standard measurement device. All membrane hydrophones from Precision Acoustics Ltd have a very wide bandwidth (typically greater than 60 MHz) and are ideally suited for the measurement of broadband ultrasonic pulses such as those found in diagnostic ultrasound.

D1604



- Differential input membrane hydrophone
- PVDF Film: 16 μm
- Active element diameter: 0.4 mm
- Typical sensitivity (1–20 MHz): 330 mV/MPa
- Usable bandwidth: 0.3 – 100 MHz
- Preamp: Encapsulated into membrane ring (non-removable)

D1602



- Differential input membrane hydrophone
- PVDF Film: 16 μm
- Active element diameter: 0.2 mm
- Typical sensitivity (1–20 MHz): 150 mV/MPa
- Usable bandwidth: 0.3 – 100 MHz
- Preamp: Encapsulated into membrane ring (non-removable)

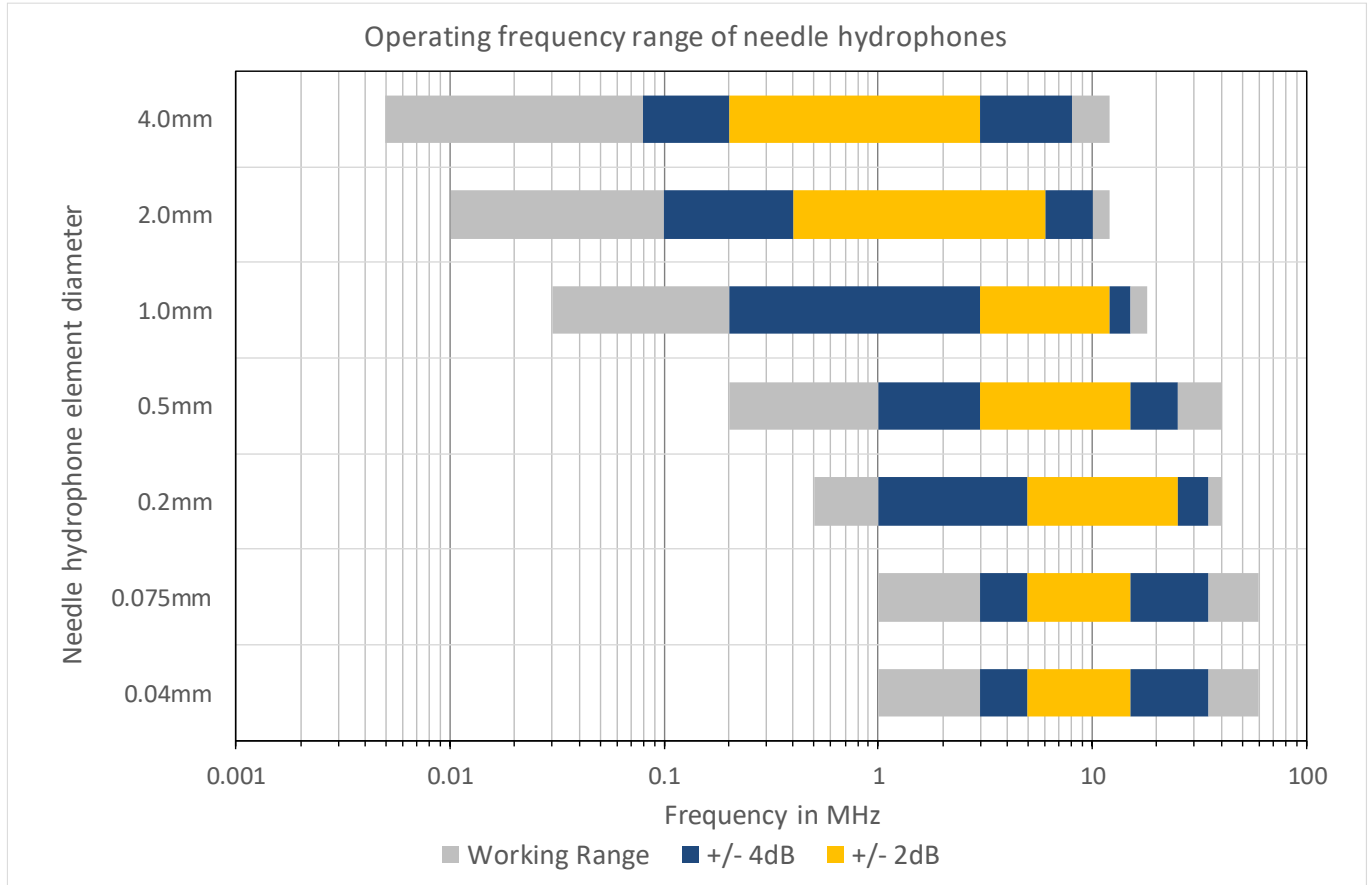
UT1604



- Single-ended input membrane hydrophone
- PVDF Film: 16 μm
- Active element diameter: 0.4 mm
- Typical sensitivity (1–20 MHz): 40 mV/MPa
- Usable bandwidth: 0.3 – 80 MHz
- Preamp: Removable, push-fit into membrane ring

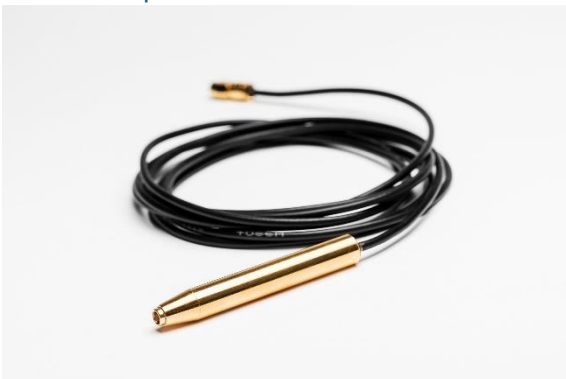
NEEDLE HYDROPHONES

Needle hydrophone are good general-purpose measuring devices. They are available in a wide range of diameters from 4.0 mm down to 0.04 mm. The frequency response of a needle hydrophone is dependent on the size of the active element of the hydrophone and the chart below provides an indication of the frequency range of these devices.



All needle hydrophones need to be used with a preamplifier and a DC coupler (shown below). These are an integral part of the hydrophone system whose primary function is to provide electrical impedance buffering.

HP1 Preamplifier



DC Coupler with Power Supply



NH4000 needle hydrophone



- Highest sensitivity needle hydrophone with the best low frequency response
- Active element diameter: 4.0 mm
- Typical sensitivity (0.8 – 8 MHz): 8 V/MPa
- ± 2 dB bandwidth: 0.2 – 3 MHz
- ± 4 dB bandwidth: 0.08 – 8 MHz

NH2000 needle hydrophone



- Good compromise between sensitivity and directionality for < 1 MHz measurements
- Active element diameter: 2.0 mm
- Typical sensitivity (0.5 – 8 MHz): 3.5 V/MPa
- ± 2 dB bandwidth: 0.4 – 6 MHz
- ± 4 dB bandwidth: 0.1 – 10 MHz

NH1000 needle hydrophone



- Ideally suited for measurements in the 0.5 – 10 MHz range
- Active element diameter: 1.0 mm
- Typical sensitivity (2 – 12 MHz): 850 mV/MPa
- ± 2 dB bandwidth: 3 – 12 MHz
- ± 4 dB bandwidth: 0.2 – 15 MHz

NH0500 needle hydrophone



- Good compromise between sensitivity and directionality for > 1 MHz measurements
- Active element diameter: 0.5 mm
- Typical sensitivity (2 – 12 MHz): 300 mV/MPa
- ± 2 dB bandwidth: 3 – 15 MHz
- ± 4 dB bandwidth: 1 – 15 MHz

NHO200 needle hydrophone



- Broad directional response and minimised spatial averaging
- Active element diameter: 0.2 mm
- Typical sensitivity (2 –12 MHz): 55 mV/MPa
- ± 2 dB bandwidth: 5 – 25 MHz
- ± 4 dB bandwidth: 1 – 35 MHz

NHO075 needle hydrophone



- Satisfies $\lambda/2$ sampling at 10 MHz and very broad directional response
- Useful for very high frequencies (up to 60 MHz)
- Active element diameter: 0.075 mm
- Typical sensitivity (2 –12 MHz): 10 mV/MPa
- ± 2 dB bandwidth: 5 – 15 MHz
- ± 4 dB bandwidth: 1 – >30 MHz

NHO040 mm needle hydrophone



- The smallest needle hydrophone in our range that satisfies $\lambda/2$ sampling at 20 MHz
- Useful for very high frequencies (up to 60 MHz)
- Active element diameter: 0.04 mm
- Typical sensitivity (2 –12 MHz): 6 mV/MPa
- ± 2 dB bandwidth: 5 – 15 MHz
- ± 4 dB bandwidth: 1 – >30 MHz

UNDERWATER HYDROPHONES

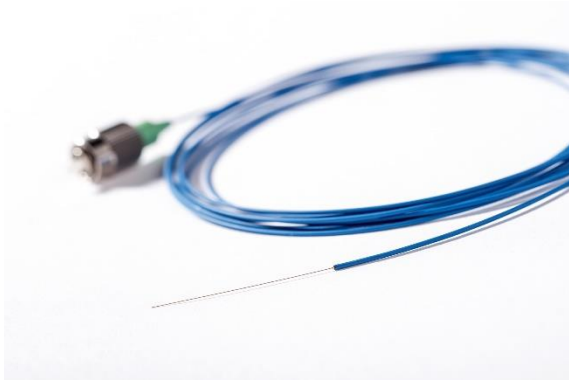
ML4X50 Piston hydrophone



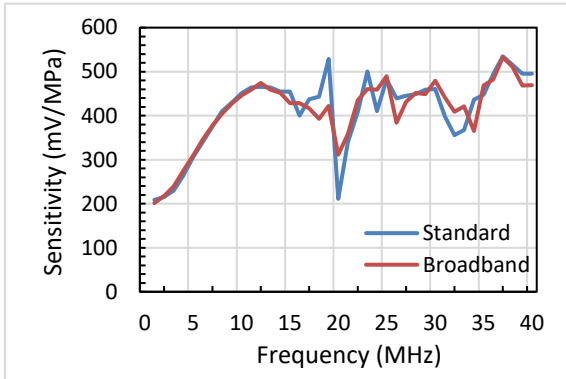
- Large area calibration hydrophone ideally suited for 0.1 to 1 MHz use
- Active element diameter: 25 mm
- Typical sensitivity (2 –12 MHz): 10 V/MPa
- ± 0.5 dB bandwidth: 300 kHz – 1 MHz
- ± 1.5 dB bandwidth: 100 kHz – 1 MHz

FIBRE-OPTIC HYDROPHONES

Fibre-optic hydrophone sensor



Standard vs. broadband sensor



Fibre chuck



Fibre-optic hydrophone control unit



- 125 μm core
- Active element defined by optically illuminated area (10 μm diameter)
- Capable of sensing pressure and temperature change
- Smoother frequency response than plane fibre-optic sensors
- Typical sensitivity (2 -12 MHz): 250 mV/MPa
- Immune to EMI

- Two variants of fibre-optic hydrophone are offered for both connector types: standard (TFS, FSV2) and broadband (TFS-BB, FSV2-BB)
- Less substantial drop in sensitivity of the broadband fibre variant between 18-22 MHz

- Provides a simple way to hold the very thin fibre-optic hydrophones
- Same size as Needle hydrophone preamplifier

- Needed with all fibre-optic hydrophones
- Provides the interrogating optics to enable the sensors to function

HYDROPHONE ACCESSORIES

Hydrophone Booster Amplifier



- Broadband, linear phase amplifier for use with all hydrophones
- Gain: >25 dB
- Bandwidth: 50 kHz – 125 MHz \pm 1 dB
- Input impedance: 50 Ω
- Output impedance: 50 Ω

Attenuator



- For use with larger diameter needle hydrophones
- Used to prevent preamplifier overload when using high sensitivity sensor in high pressure fields
- Attenuation: 20 dB \pm 3 dB
- Bandwidth: 10 kHz – 100 MHz \pm 0.5 dB

L-Shaped Hydrophone Mount



- For use with needle and fibre-optic hydrophones
- Simple, cost-effective mount that allows the hydrophone active element to be placed below the centre of rotation

Fully adjustable hydrophone mount



- For use with membrane, needle or fibre-optic hydrophones
- Allow rotation about the hydrophone active element in all 3 planes