Introduction

This is a high-sensitivity low-noise hydrophone in the human auditory range. It is very durable and can interface directly with a charge amplifier or high-input-impedance voltage amplifier. Its streamlined shape and high specific gravity will help to maintain a low working depth in mild wind and currents. Its compact size and flexible cable make it very portable and simple to use.

The hydrophone utilizes a passive piezo sound pickup. There is no preamp or impedance buffer circuit within it. The advantages are that the hydrophone remains as simple and low cost as possible, it does not require any power supply, and it offers a very wide dynamic range. It can work under either charge mode or high impedance voltage mode.

BNC plug version (default)
Low Noise Cable: 9m (default)

1/4" TS plug version
Low Noise Cable: 9m (default)

Specifications

Transducer Type	Plate Bender
Frequency Range	20Hz~4kHz (±4dB)
Sensitivity	-185dB re: 1V/μPa (Typical) (i.e. 5.6×10^{-4} V/Pa)
Useful Frequency Range	(<10Hz) ~ (>100kHz) (Sensitivity ≈ -220dB re: 1V/μPa @ 100kHz)
Capacitance	20nF (Typical)
Charge Sensitivity	11.2 pC/Pa (Typical)
Operating Depth	<80m
Size	ϕ25mm × 46mm
Weight	105g
Specific Gravity	5.3
Added Weight	No required
With Built-In Preamp	No
Polar Response	Omnidirectional (horizontal)
Connector	BNC (default, 1/4" TS connector version available on request)

Important Notice: The hydrophone has not been individually calibrated. Only the nominal values are provided, their use in absolute sound level measurement is thus not recommended (Please check our other products instead).

Used under Charge Mode

When the hydrophone is used with a charge amplifier followed by a data acquisition device, such as CAMP-2G05, the underwater sound level measurement range will be determined by the sensitivity and measurement range of the hydrophone as well as the full-scale input charge and signal-to-noise ratio of the data acquisition device. For example, if the charge sensitivity of the hydrophone is 11.2 pC/Pa and the full-scale measurement range of the charge data acquisition device is 250 pC, then the maximum underwater sound level measurable would be: $20\times\log_{10}((250/1.414)/11.2/(1\times10^{-6}))\approx 144$ dB, where 1.414 is used to convert peak value to RMS value, and 1×10^{-6} Pa is the 0 dB reference in water. If the charge data acquisition device has multiple full-scale charge ranges (e.g. VT CAMP-2G05): 250pC, 500pC, 1nC, 2.5nC, 5nC, 10nC, 25nC, 50nC, 100nC, 250nC, 500nC, 1μC, then the maximum underwater sound level measurable would be 144dB, 150dB, 156dB, 164dB, 170dB, 176dB, 184dB, 190dB, 196dB, 204dB, 210dB and 216dB, respectively.

The advantage of using a charge amplifier is that the signal will not be attenuated by cable capacitance unlike the case of a voltage amplifier. A charge amplifier usually has an ultra low high-pass cutoff frequency, thus the extremely low frequency noise of the hydrophone resulting from the movement by towing or waves may get through.

Used under High Impedance Voltage Mode

It is possible to use the hydrophone with a high-input-impedance voltage amplifier followed by a data acquisition circuit, such as a DSO which usually has an input impedance equal to or greater than 1MΩ. The higher the input impedance and the shorter the cable, the lower the high-pass cutoff frequency. For this hydrophone with a cable length of 9m, the cutoff frequency can be estimated by:

$$f_c = 1/(0.000000157\times R)$$

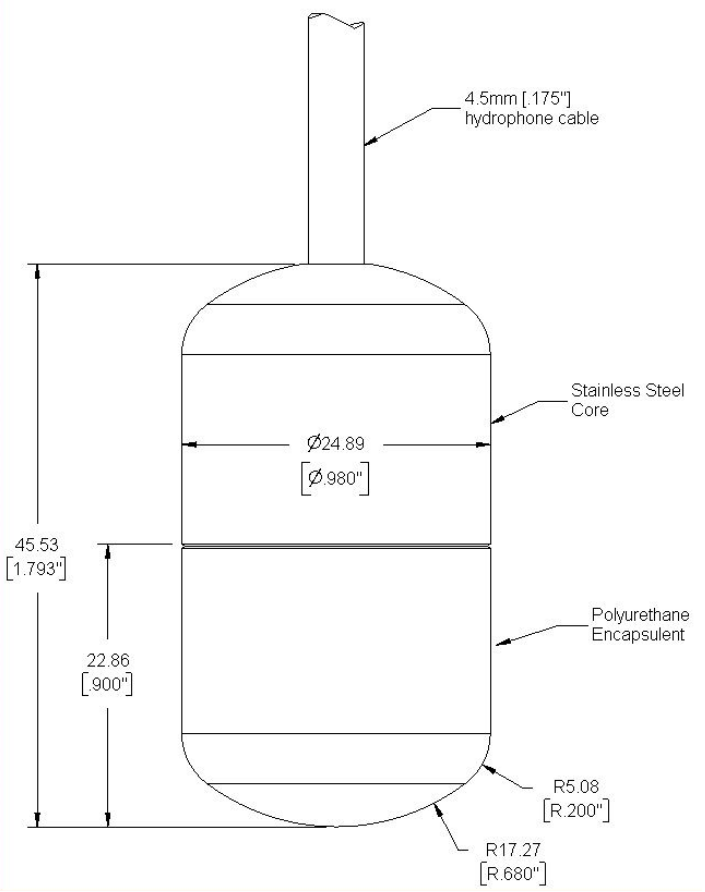
where R is the input impedance of the voltage amplifier. For example, if R=1MΩ, the f_c=6.4Hz.

Voltage sensitivity is normally given with the default cable length. If the voltage sensitivity of the hydrophone is 5.6×10^{-4} V/Pa and the full-scale measurement range of the voltage data acquisition device is 0.01V, then the maximum underwater sound level measurable would be: $20\times\log_{10}((0.01/1.414)/0.00056/(1\times10^{-6}))\approx 142$ dB.

It can also be used with an audio amplifier or a sound card with a high impedance (HiZ) input.

Maintenance

No special care is required for the hydrophone. It is designed to withstand corrosion from seawater and the impact of accidental drops. Although it is quite tough for what it is, but note that it is a sensitive instrument. Avoid throwing it into the water, or any other activity that may result with an impact to the hydrophone. Try to keep the output plug clean and dry and avoid unnecessarily rough handling to ensure the long-term stability of the product. It is best NOT to store the hydrophone in a waterproof enclosure. Doing so will trap moisture, salts and minerals that are left on the hydrophone and cable after deployment and prematurely corrode the output plug. Making an extra effort to coil the cable neatly when retrieving the hydrophone will help avoid problems with tangles as the cable ages. Most importantly, protect the cable from cuts and abrasions! The hydrophone uses a custom-made cable with a very durable PU jacket. However, it is also designed to be compact and flexible. Kinking the cable, walking on it, or dragging it over a sharp or abrasive surface may damage the cable sheath and eventually cause the hydrophone to fail. Both aquatic and terrestrial animals may attack the cable in an unattended application. Using some kind of cable conduit, such as plastic tubing, can help to protect the hydrophone in long-term installations.


4.5mm [.175"]
hydrophone cable
Stainless Steel
Core
Ø24.89
[Ø.980"]
45.53
[1.793"]
22.86
[.900"]
Polyurethane
Encapsulent
R5.08
[R.200"]
R17.27
[R.680"]