Aquarian Audio

H2dM Hydrophone User's Guide

The H2dM hydrophone is designed to offer great sensitivity and low self noise in the human auditory range while being rugged, compact and affordable. Its small, streamlined shape and high specific gravity will help maintain a low working depth in mild wind and currents. Its compact size and flexible cable make it very portable and simple to use. It will interface directly with compact digital recorders and other devices with mic preamps designed for electret-condenser microphones with 3.5mm input.

Using the H2dM

The H2dM is terminated with a 3.5mm TRS plug and wired for dual-mono output (output wired to both tip and ring; sleeve contact to ground). The most common application is driving a compact stereo digital recorder. This output configuration will also work with nearly all video cameras and computer sound interfaces[1] with 3.5mm mic input. **Plug-in power (PIP) is required and may need to be switched on in your device.** When recording with only one hydrophone, direct connection is made to the recorder and both left and right channels will record the same information. If wanting to record true stereo sound with two hydrophones, an adapter is typically needed that breaks out the left and right channels of the recorder into separate input jacks.

Please note that the 3.5mm jack is used for many kinds of audio connections. **The H2dM will only work with microphone inputs.** The hydrophone plug will fit into auxiliary inputs on powered speakers or marine stereo systems, but these will not provide PIP to the signal conditioning board in the H2dM, nor will they provide adequate gain. This connector is also used with headphone outputs. Also see footnote 1 below. Do not make the assumption that, if the plug fits, the system will work.

Hydrophone care

No special care is required for the H2dM. It is designed to withstand corrosion from seawater and the impact of accidental drops[2]. 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 H2dM 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 protect the hydrophone in long-term installations.

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1 An adapter will be needed for most headset jacks (TRRS jacks that are designed to have a microphone contact as well as headphone outputs). These are common on smart phones, tablets and laptop computers.

2 The H2dM uses a plate sensor on the end opposite the cable—somewhat like a microphone diaphragm. It is extremely crush-resistant with radial loads, but may be damaged if dropped on its end. 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. One great advantage of this design is that it is easy to repair if necessary. Contact Aquarian for support.

Specifications

Specifications are dependent upon the audio device to which the H2dM is connected and whether the hydrophone is driving stereo inputs or a single channel. The output impedance of the H2dM is set by the PIP supply from the audio device with which the hydrophone is used. Gain of the signal conditioning amplifier in the H2dM is related to the bias current and input impedance of the mic preamp. High-frequency performance is also limited by the output impedance of the hydrophone and the cable impedance—which is a function of length. For all of these reasons, we do not publish detailed response plots for this design. Please also note that further limitations in your overall system may result from the sampling rate of digital recorders and by the input stage of your audio device's microphone preamp.

Note that there is no standard for plug-in power. Performance can vary significantly. The following specifications are based on typical response when using the H2dM with a compliance voltage of 2.5V and bias resistor of 1.1KΩ (two channels at 2.2KΩ each—2.2mA—typical of many compact digital recorders, including those that we sell).

Sensitivity:	-172dB re: 1V/μPa	(+/- 4dB 20Hz-4KHz)
Useful range:	<10 Hz to >100KHz	(not measured above 100KHz, approximate sensitivity @100KHz = -220dB re: 1V/μPa)
Polar Response:	Omnidirectional (horizontal)	
Operating depth:	<80 meters	
Output impedance:	1.1 KΩ	(typical)
Power:	0.7 mA	(typical)
Minimum PIP req.:	2V, 0.7mA	(compliance voltage, short-circuit current) (the hydrophone will work with lower current, but with very unpredictable gain and greatly-reduced dynamic range)

Physical:		(cable and output plug excluded)
Dimensions:	25mm x 46mm	
Mass:	105 grams	
Specific Gravity:	5.3	