



## **Aquarian Audio Products**

# **H1c Hydrophone User's Guide**

Thank you for purchasing your *Aquarian Audio Products* H1c fixed-mount hydrophone. This hydrophone is designed to provide high-quality audio performance in a low-cost device. It will interface directly with high-impedance microphone or instrument preamps, as well as test and measurement devices. It offers good sensitivity and low noise in the human auditory range. The H1c's small size, hydrodynamic shape, rugged build, and solid 1/4" NPT mount make it an ideal hydrophone for many long-term installations.

### **Using the H1c**

The H1c utilizes a passive piezo sound pickup. There is no preamp or impedance buffer circuit within the hydrophone. The advantages are that the hydrophone remains as simple and low cost as possible, it does not require any power, and it offers a very wide dynamic range. In addition, the H1c can be used as a low-power projector. System gain and input impedance must be considered while choosing a preamp.

System gain is the amount of signal amplification required and will depend on the amplitude of the sounds that you are attempting to monitor, as well as what you are doing with the output. Generally speaking, if you are driving headphones or a line audio circuit, or working with a computer sound device, you may require 20 dB of gain for industrial monitoring, 40 ~ 50 dB for listening to cetaceans and large aquatic wildlife, and 60 dB or more for very distant or faint sounds.

Input impedance is the amount of load that your preamp puts on the hydrophone. The low-frequency response of a piezo transducer, such as that used in the H1c, will be limited by the input impedance of the preamp. Higher input impedance will give you an extended low-frequency response. This relationship can be calculated for the H1c with the following formula:

$$F_c = 1 / 0.000000157 * R$$

$F_c$  is the frequency at which electrical output is 3dB down from nominal and  $R$  is the input impedance of your preamp.

Therefore, using a preamp with an input impedance of approximately 320 Kohms will give you a low-frequency cutoff of 20Hz—the low end of what humans can hear. A preamp with an input impedance of 100 Kohms might work well for the PA system on a whale-watching vessel, giving a  $F_c$  of 64 Hz, which is compatible with the capabilities of most speaker systems. The higher  $F_c$  might also help filter the extreme low frequency noise caused by the rise and fall of the hydrophone as the boat moves on a swell or from cable strum or mechanical noises that may be transmitted through a hull or boom. For industrial monitoring applications, the typical input impedances of a scope or data acquisition device will permit the capture of low infrasound. This may be beneficial to the user, but it may also contribute to decreased thermal stability, and increased noise.

### **Mounting and Electrical Connection**

The H1c uses a standard (ANSI) 1/4" male pipe thread for mounting. Many common types of fittings are available at your local hardware store. If you are mounting directly to a hull, tank wall, or equipment housing, drills and taps are also commonly available. Use a 7/16-inch (0.438", 11.1mm) tap drill and take care to align your tap with the hole, cutting threads only as deep as required. Note that pipe threads are tapered. It is possible to run a pipe tap too deep.

## **CRITICAL NOTES:**

- A thread sealing compound is required! The hydrophone is completely submersible, but the cable is not water-blocked and we can not be liable for damage to other equipment caused by leaks. Liberal use of a below-waterline marine-quality sealant is recommended.
- Do not apply force to the black surfaces of the hydrophone during installation. Use a 7/16" or 12mm open-ended wrench to firmly tighten the hydrophone into its mounting hole.
- The mounting stem of the H1c is connected to signal ground. If you are mounting the hydrophone to a metal pipe or surface, ensure that the mounting surface is not connected to any voltage potential other than your preamp signal ground. Noise can be caused by having multiple ground paths between the hydrophone and preamp. If you are grounding the H1c through it's mounting surface, it may be beneficial for you to disconnect the ground lead at the hydrophone cable.

The standard H1c is sold with a bare-wire (no termination) output. The cable shield is electrically connected the stainless steel hydrophone core and to signal ground. The center conductor carries the signal.

If you have purchased the H1c with an optional termination, it should be wired for direct connection to any mating plug unless you have specified something unique.

If your wire connection will be open to the environment, use a silicone dielectric grease to minimize corrosion.

## **Specifications**

The H1c is intended to be durable and low-cost. Deriving high sensitivity and low noise from lower-cost components were made a priority over maintaining strict tolerances. The following specifications are typical of a limited sample group and are not guaranteed. They are for basic comparison information only.

Sensitivity:	-190dB re: 1V/ $\mu$ Pa	(+/- 4dB 20Hz-4KHz)
Useful range:	<1 Hz to >100KHz	(not measured above 100KHz, approximate sensitivity @100KHz = -220dB re: 1V/ $\mu$ Pa)
Capacitance:	25nF	
Polar Response:	Omnidirectional	(horizontal)
Operating depth:	<80 meters	

### **Physical:**

Dimensions:	25mm x 58mm
Mass:	49 grams
Mounting Thread:	1/4"-18 NPT
Output:	Unterminated, or custom