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# Hydrophones

## Hydrophones

Hydrophones are, quite simply, underwater microphones. Wilcoxon's hydrophones are built to withstand the rigors of continuous underwater exposure at the specified depths continuously. These units are designed to be used in sea water or fresh water environments.

Each hydrophone has a built-in electronic amplifier. The hydrophone output is a dynamic signal superimposed upon the Bias Output Voltage (BOV). Hydrophone sensitivity is traditionally specified as a decibel (dB) level referred to 1 Volt per micropascal (V/ $\mu$ Pa).

### Hydrophone Sensitivity

The traditional standard for calibration sensitivity is dB with respect to Volts/ $\mu$ Pa. Underwater acousticians are familiar with this term while those outside of acoustics may be more familiar with terms such as Volts/PSI.

1 Pascal (Pa) = 1 Newton/Square Meter (N/m<sup>2</sup>)

1 micro-Pascal ( $\mu$ Pa) = 10<sup>-6</sup> Pascal

1 Pound per Square Inch (PSI) = 6,894.8 Pascal

1 milli-Volt ( $\mu$ V) = 10<sup>-3</sup> Volts

1 nano-Volt ( $\mu$ V) = 10<sup>-9</sup> Volts

A sensitivity of 0 dB re 1V/ $\mu$ Pa is equivalent to 1V/ $\mu$ Pa of voltage sensitivity

A sensitivity of -120 dB re 1V/ $\mu$ Pa is equivalent to 1V/Pa of voltage sensitivity

A sensitivity of -160 dB re 1V/ $\mu$ Pa is equivalent to 10  $\mu$ V/Pa of voltage sensitivity

A sensitivity of -160 dB re 1V/ $\mu$ Pa is also equivalent to 68.9 V/psi of voltage sensitivity

### Wilcoxon Hydrophones:

Model	Style	Sensitivity	Low Freq	High Freq
H505L	N/A	-160 dB re 1 V/ $\mu$ Pa	2.0 Hz	10 kHz
H507A	N/A	-188 dB re 1 V/ $\mu$ Pa	10 Hz	100 kHz

Note: Frequency @  $\pm$ 3dB.



## Model H505L

General Purpose, Internally Amplified Hydrophone

The H505L Hydrophone is designed as a small, versatile, self-amplified hydrophone for general purpose application to a wide variety of underwater acoustic measurements. Ruggedness, low cost and an ultra low-noise internal amplifier are prime features of this unit. The internal amplifier eliminates triboelectric cable noise, connector contamination problems and the requirement for an expensive in-line amplifier.

The hydrophone and cable entry are completely encapsulated in polyurethane. This alleviates water intrusion and corrosion caused by cathodic action. The assembly uses stabilized piezoelectric (PZT) sensing elements.

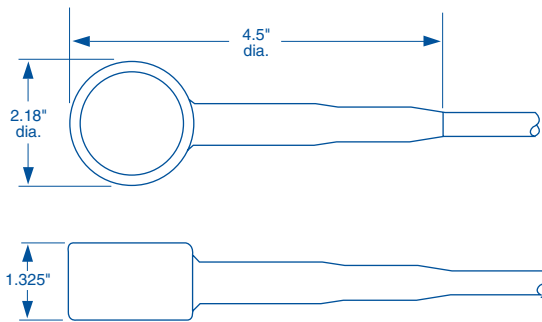
Applications for the H505L include underwater biological studies, ship noise studies, pump and machinery studies and monitoring of underwater ordnance.

Output Sensitivity .....	-160 dB re 1V/ $\mu$ Pa
Amplifier Gain .....	10 dB
Typical Spectrum Noise:	
at 10 Hz .....	54 dB re 1 $\mu$ Pa/ $\sqrt$ Hz
at 100 Hz .....	34 dB re 1 $\mu$ Pa/ $\sqrt$ Hz
at 1 kHz .....	15 dB re 1 $\mu$ Pa/ $\sqrt$ Hz
at 10 kHz .....	6 dB re 1 $\mu$ Pa/ $\sqrt$ Hz
Frequency Response, $\pm$ 3dB .....	2.0 to 10,000 Hz
Omnidirectional .....	2.0 to 5,000 Hz
Maximum Operating Depth .....	250 meters
Maximum Temperature .....	80°C
Output Impedance .....	200 ohms
Supply Voltage .....	24 VDC
Current .....	10 mA max
BOV .....	10 volts nominal
Cable .....	J95, 5 conductor, shielded, 10 meters standard, 0.25" dia. Polyurethane
Jacket Material .....	Polyurethane

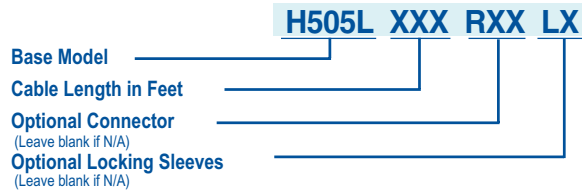
Color	Function
Shield	case ground
Black	signal return, common
Red	+24 VDC
Green	calibration input
White	signal output
Yellow	not used, open

### OPTIONS:

- Customer specified cable length
- Brantner RMK-G-MP (R12) or AWM-6-MP (R13) connectors (see drawing).
- Male locking sleeves (plastic or stainless steel) for connectors listed.



### How to order H505L:



- Available Connectors: R12 Underwater Connector (Brantner RMK-6-MP)  
R13 Underwater Connector (Brantner AWM-6-MP)
- Available Locking Rings: LP = Plastic Locking Sleeve for R12 or R13  
LS = Stainless Steel Locking Sleeve for R12 or R13

## Model H507A

Ultra Low Noise, Wide Band Hydrophone



### DYNAMIC

Sensitivity, referred to input .....	-188 dB re 1 V/ $\mu$ Pa
Frequency Range, $\pm 3$ dB .....	10 to 100,000 Hz
Gain <sup>1</sup> .....	10 dB
Patterns:	
XY Plane, nondirectional .....	$\pm 1$ dB to 100 kHz
XZ or YZ Plane, nondirectional .....	$\pm 1$ dB to 10 kHz
XZ or YZ Plane, nondirectional over 270° span .....	$\pm 1.5$ dB to 100 kHz
(attenuation in direction of cable exit)	
Acceleration Sensitivity, re 1 $\mu$ Pa/g, 10 Hz .....	162 dB
Noise, re 1 $\mu$ Pa/ $\sqrt$ Hz:	
1 kHz .....	31 dB
10 kHz .....	22 dB
100 kHz .....	18 dB

### ELECTRICAL

Supply Voltage .....	18 - 24 VDC
Bias Output Voltage, nominal .....	10 VDC
Supply Current .....	4 - 10 mA
Maximum Output .....	3 V rms
Output Impedance .....	50 $\Omega$
Calibration pad .....	-14 dB, 40 $\Omega$ & 10 $\Omega$ 0.1W, 1 VAC rms max. input

### ENVIRONMENTAL

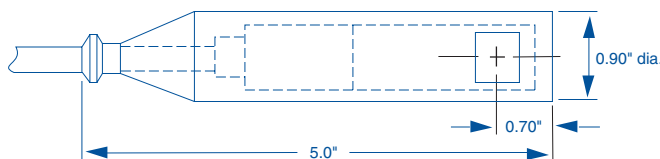
Operating Depth .....	500 meters
Maximum Depth .....	1000 meters
Maximum Cable Length, operation to 100 kHz .....	200 meters
Maximum Temperature .....	80°C

### PHYSICAL<sup>2,3</sup>

Cable .....	10 ft., 5 conductor plus shield, stripped & tinned
External Material .....	Polyurethane

Color	Function
Shield	case ground
Black	signal return, common
Red	+24 VDC
Green	calibration input
White	signal output
Yellow	not used, open

- NOTES:**
- Gain will vary as a function of crystal capacitance.
  - Connectors are available with plastic or metal male locking sleeves. Please specify at time of order.
  - Customer specified length.
- OPTIONS:** Brantner RMK 6MP underwater connector; Brantner AWM 6MP underwater matable connector; switchable gain (Model H507B)



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