

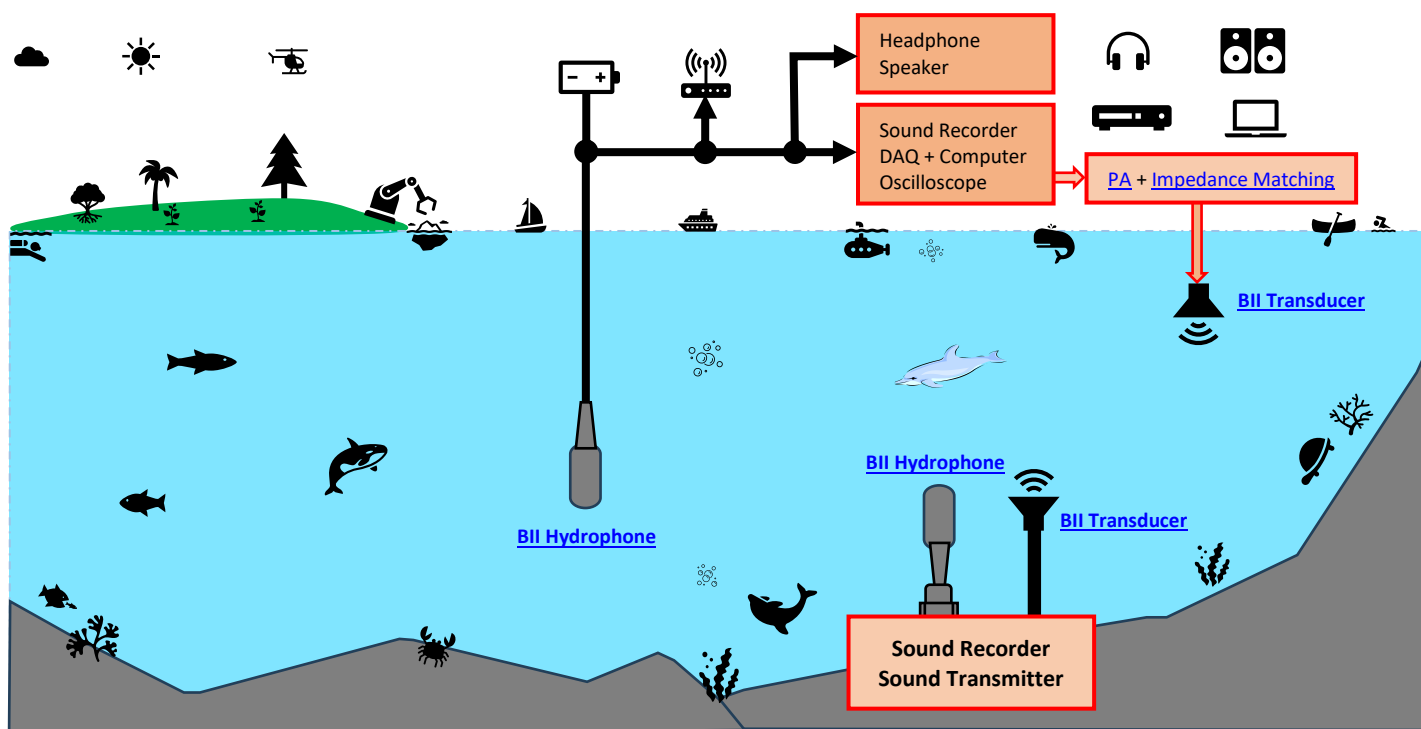


BII7120 Series Low Noise, Low Power, and Low Frequency Hydrophone: Noise Level Below Sea State Zero

BII's low noise hydrophones are optimized to possess self noise levels below sea-state zero with omnidirectional response in low frequency range and toroidal response in high frequency range. Its streamlined hemispherical dome minimizes drag force and hydrodynamic noise. The power consumption can be customized to be [600µA quiescent current at 5VDC](#) for battery powered underwater instrumentation. A spatial array of multiple hydrophones can be set up for directional measurement system. The hydrophones can measure underwater sounds and pressure fluctuations down to 0.1Hz infrasonic sounds: surface waves (Wave-height Sensor), turbulences, seismic, ocean traffics, industrial noises, precipitations, biologics, ...

With these low power hydrophones, battery and system lifetimes are extended, and lighter portable systems with lower-capacity batteries can be achieved. Its compact small size avoids interferences to acoustic field under test. The preamplifier integrated in the hydrophone can drive cable up to 200m without signal loss. Available cable terminals include audio connectors (TRS, XLR), BNC, and underwater mateable connectors. The housing and mounting part are corrosion resistant plastics and/or stainless steels.

Underwater Sound Listening, Recording, and Communication



Typical Applications

Underwater Sounds Recording, Listening, and Communication, Noise Measurement, Marine Bioacoustics, Passive Acoustic Monitoring (PAM System).
Coastal/Offshore Processes, Engineering & Management, Wave-Structure Interaction, Wave-height Sensor, Wave and Tide Recorder/Logger.
Surface Waves, Ocean Turbulences, Hydrodynamics, Marine Geophysics, Battery-Powered Instruments: Sonobuoy, Recorder, Transponder, Acoustic Release...

Questions

How do I set up my professional sound recorders to work with BII Hydrophones?

1. BII hydrophones have their own DC power supply to support **Line Input** of recorders, and **Do NOT** use phantom power 48V which may destroy the hydrophones.
2. **Maximum Input Level (Line Input)** of recorders should be large enough to avoid saturation or clipping during recording.
Equivalent Input Noise of recorders should be low enough for the recorders to be sensitive to weak signal of the interest.
3. **Sampling Rate** of the recorder should be fast enough to avoid missing high frequency sound of the interest. Generally, the **Sampling Rate** should be at least two times greater than the maximum frequency of sound.
4. Calculate the **memory size of data storage** according to sampling rate, resolution, sampling channels, and recording time, and use suitable recording media.
5. Calculate **battery service life** according to battery power and consuming current.
6. When the cable is greater than 5m, **balanced signal or differential signal** is recommended to be in use over the cable.

How do I playback the recorded sounds in water?

System Setup: Recorder (Recorded Sounds) with **Line or Phone Output** -> [Audio Power Amplifiers](#) -> [Impedance Matching Device](#) -> [Transducers \(Projectors\)](#).

Can a hydrophone with differential outputs be wired to single-ended inputs of a DAQ device (Data Acquisition Equipment) such as an Oscilloscope?

Yes, output+ and Common of a BII hydrophone can be used a single-ended signal, or Output- and Common of the hydrophone can be used a single-ended signal.

But, neither output+ nor output – of the hydrophone can be wired to common which is going to destroy the hydrophone by short circuit.

Specification

Part Number:	BII7128FGDF	BII7128PGDF
Sensitivity FFVS @ 1 kHz:	-193.6 + Preamp Gain.	
± 2 dB V/μPa.	-167.6 dB	-183.6, -143.6 dB
FFVS:	Bespoke, Refer to Graph of FFVS vs. Frequency . Free-field Voltage Sensitivity.	
Pressure Noise Density:	Refer to Graph of Pressure Noise Density , Referred to Input (RTI), in μPa/√Hz.	
Usable Frequency:	In Water: 0.1 Hz ~ 40 kHz at - 3 dB V/μPa.	
	In Air: 0.1 Hz ~ 3.5 kHz at -3dB V/μPa.	
Wave Height:	0.001 to 100 m. Refer to Graph of Water-Bottom Dynamic Pressure of Surface Wave .	
Note: BII calibrates sensitivity of the hydrophone in dB V/μPa. Buyer should calibrate the wave height and its pressure field underwater in the case of the hydrophone is used to measure surface wave heights.		
Preamp Gain:	Fixed Gain Preamp: 26 dB.	Programmable Gain Preamp: 10 and 50 dB.
	Avoid Saturation. When there are strong low frequency noises, disturbances, and/or vibrations, resulting from rough surface waves and/or mechanical movements of the platform, choose low-preamp-gain to avoid hydrophone saturation.	
Built-in Preamp:	Yes, Low Noise Preamp.	
-3dB Beam Width:	Omnidirectional and Toroidal. Refer to Graph of Directivity Pattern .	
Output Type:	Differential	Differential
	To reject Electromagnetic Interference (EMI) over long cable, the differential (balanced) output is recommended.	
Maximum Output V_{omax} :	$V_{omax} = (\text{Supply Voltage } V_s - 4) V_{pp}$.	
Overload Pressure Level:	194 or $[20 \cdot \log(V_{omax}/2.828) - \text{Sensitivity}]$, whichever is less. in dB μPa.	
Acceleration Sensitivity:	120.5 dB re μPa/(m/s ²)	
Operating Depth:	Maximum 300 m or 3 MPa pressure and limited by the cable length if the cable has wire leads or a non-waterproof connector.	
Mounting Options:	<ol style="list-style-type: none"> 1. Default: Free Hanging (FH). 2. Free-hanging with Male Underwater Connector (FHUWC). 3. Thru-hole Inch Mounting with Single O-ring Sealing (THISO, 7/16"-20 x 22 UNF-2A). 4. Thru-hole Inch Mounting with Double O-ring Sealing (THIDO, 7/16"-20x25 UNF-2A, Right Hand). 5. Bolt Fastening Mounting (Plastics) (BFMP, M12x1.5). 6. Bolt Fastening Mounting (Plastics) (BFMP, NPT3/8"). 7. Bolt Fastening Mounting (Stainless Steel) (BFMSS, 5/8"-18x22 UNF). 	
	Please refer to online document AcousticSystem.pdf for a complete list of Mounting Options and more details.	
Cable:	Four Conductor Shielded Cable (SC)	
Cable Length:	1. Default: 10 m. 2. Custom-fit up to 200 m.	
Connector:	<ol style="list-style-type: none"> 1. Default: Wire Leads (WL) 2. 1/8" (3.5mm) TRS Plug (TRS) (Max. Diameter Φ10.5 mm). 3. XLR Receptacle with 3 Male Pins (XLR3), (Max. Diameter Φ20.2 mm). XLR Receptacle with 4 Male Pins (XLR4), (Max. Diameter Φ20.2 mm). XLR Receptacle with 6 Male Pins (XLR6), (Max. Diameter Φ20.2 mm). 4. MIL-5015 Style (pin) (MIL) (Diameter Φ19 to Φ30 mm). 5. Underwater Mateable Connector (pin) (UMC) (Max. Diameter Φ21.5 to Φ35 mm). 6. +9VDC Battery Snap (BS), for +9VDC or +18VDC power supply. 7. 4mm Banana Plug Pair (Red and Black Color) (BP), for DC power supply ONLY. 	
	Underwater Mateable Connectors are for underwater uses. Other connectors/wire leads are for dry uses and are not waterproofed.	
Current (Quiescent):	6.9 mA	
Supply Voltage V_s :	+8.5 to +32 VDC.	
Suggested DC Supply:	+9 VDC Battery, Marine Battery, Automobile Battery, Fixed DC Linear Power Supply, Not Included. DO NOT use variable power supply whose maximum supply voltage is higher than the rated voltage. DO NOT use switching mode DC power supply.	
Size:	ΦD = Φ34.8 mm, Length ≥ 60 mm and actual length depends on Mounting Parts.	
Weight:	≥ 0.55 kg with 10m cable. Actual weight depends on Mounting Parts, Cable Types and Length.	
Operation Temperature:	-10°C to +60°C or 14°F to 140°F.	
Storage Temperature:	-20°C to +60°C or -4°F to 140°F.	
Sound Measurement in Air: The hydrophones can be used to detect sounds in air. The sensitivity in air is same to the one in water in low frequency range.		

Wiring Information of Hydrophones with Fixed-gain Preamps:

Differential Output:	Wire Leads	Underwater/XLR3 Connector	XLR3 + 9V Battery Snap	TRS + 9V Battery Snap
+VDC	Red	Pin 3	Battery Female Snap	Battery Female Snap
Common	Black	Pin 1	Battery Male Snap	Battery Male Snap
Signal+	White	Pin 2	XLR Pin 2	TRS Tip
Signal-	Blue, Green, or Yellow	Pin 4	XLR Pin 3	TRS Ring
Signal Common	N/A	N/A	XLR Pin 1	TRS Sleeve
Shielding	Shield	N/A	XLR Metal Shell	N/A

Wiring Information of Hydrophones with One-Bit-Word Programmable Gain Preamps:

Differential Output:	Wire Leads	Underwater/XLR3 Connector	XLR3 + 9V Battery Snap	TRS + 9V Battery Snap
+VDC	Red	Pin 3	Battery Female Snap	Battery Female Snap
Common	Black	Pin 1	Battery Male Snap, XLR Pin 1.	Battery Male Snap, TRS Sleeve.
Digital Common	Yellow or Brown	Pin 5	Yellow or Brown	Yellow or Brown
Digital A0 (FFVS Selection)	Blue	Pin 6	Blue	Blue
Output Signal+	White	Pin 2	XLR Pin 2	TRS Tip
Output Signal -	Green	Pin 4	XLR Pin 3	TRS Ring
Shielding	Shield	N/A	XLR Metal Shell	N/A

4mm Banana Plug Pair: Red Plug for +VDC, Black Plug for Common of the DC power supply.

Selecting Sensitivity of One-Bit-Word Digitally Programmable

FFVS Selection Wire A0	Sensitivity FFVS at 1kHz.
0 (Logic Low)	-193.6 + 10 dB V/μPa
1 (Logic High)	-193.6 + 50 dB V/μPa

How to Order Hydrophones. The default options are for stock items which are regularly available.

FG: Fixed Gain; **PG:** Programmable Gain; **DF:** Differential Output.

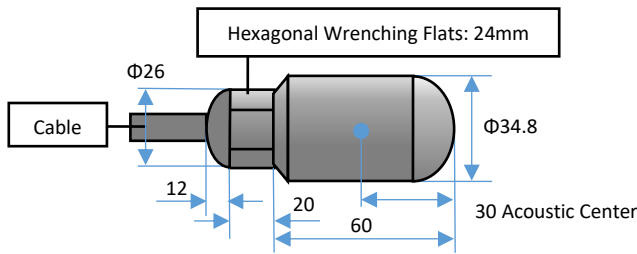
Hydrophone	-Mounting	-Cable Length	-Connectors for Signal/DC Supply
BII7128FGDF	Refer to Options.	in meter.	Refer to Options.
BII7128PGDF	Default: Free Hanging.	Default: 10m.	Default: Wire Leads.

Example of Part Number: **Description**

BII7128PGDF-THSO-0.6m-WL	BII7128PGDF Hydrophone, Thru-hole Mounting with Single O-ring (THSO), 0.6m Shielded Cable, Wire Leads.
BII7128FGDF-FH-100m-XLR3/BS	BII7128FGDF Hydrophone, Free Hanging, 100m Shielded Cable, 3-pin XLR Plug for Signals, +9V Battery Snap for DC Supply.
BII7128FGDF-FH-100m-TRS/BP	BII7128FGDF Hydrophone, Free Hanging, 100m Shielded Cable, 1/8" TRS Plug for Signals, 4mm Banana Plug Pair for DC Supply.
BII7128FGDF-FH-100m-XLR4	BII7128FGDF Hydrophone, Free Hanging, 100m Shielded Cable, 4-pin XLR Plug for Signals and DC Supply.

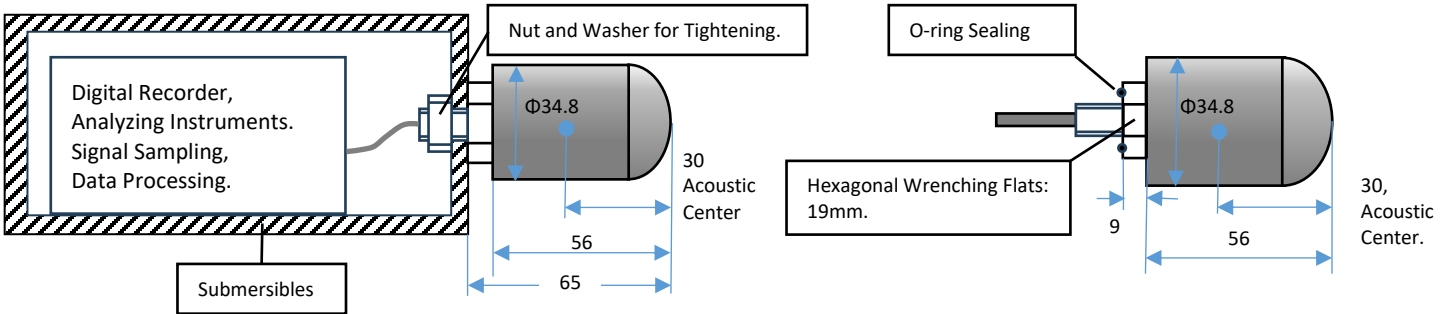
Physical Size (Dimensional Unit: mm): The overall length varies with the length of the built-in preamplifier and mounting parts.

a. Size information of Free Hanging.

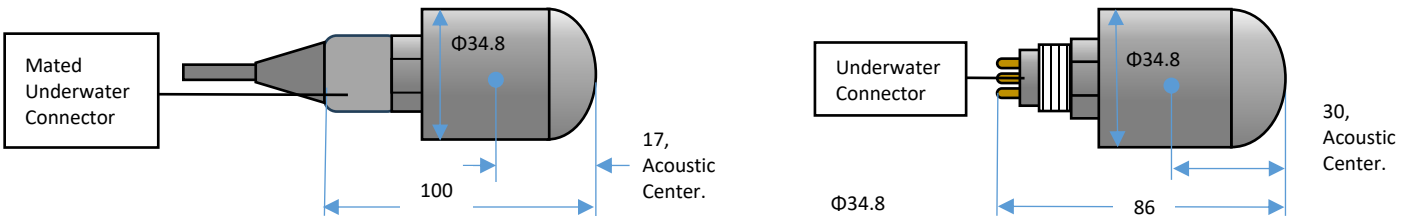


b. General Size information.

2. Thru-hole Inch Mounting with Single O-ring Sealing (THISO) 7/16"-20x22 UNF-2A.

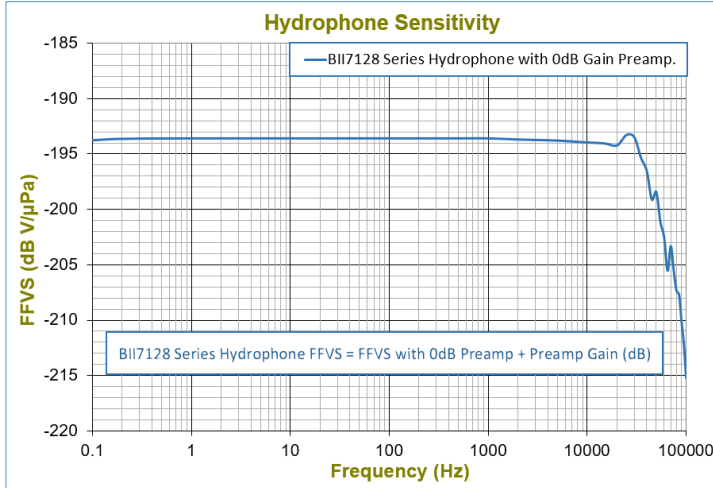


2. Free-hanging with Underwater Connector (FHUWC), 4 Pins (Fixed Sensitivity), 6 Pins (Programmable Sensitivity)

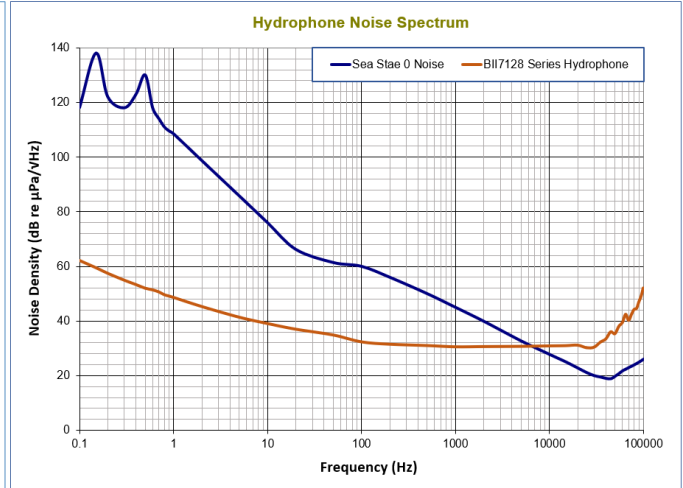


3. More Mounting/Installation Options: Please refer to online document [AcousticSystem.pdf](#) for a complete list of Mounting Options and details.

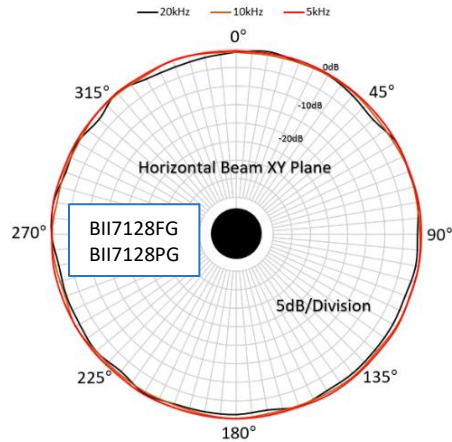
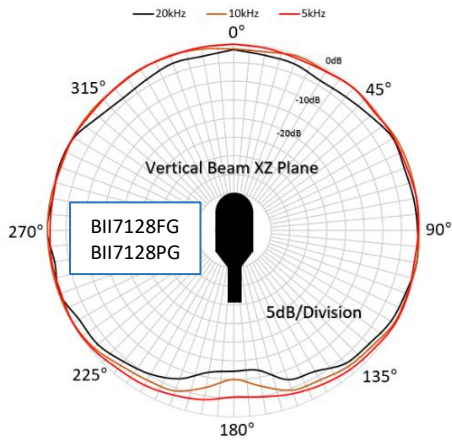
Free-field Voltage Sensitivity:



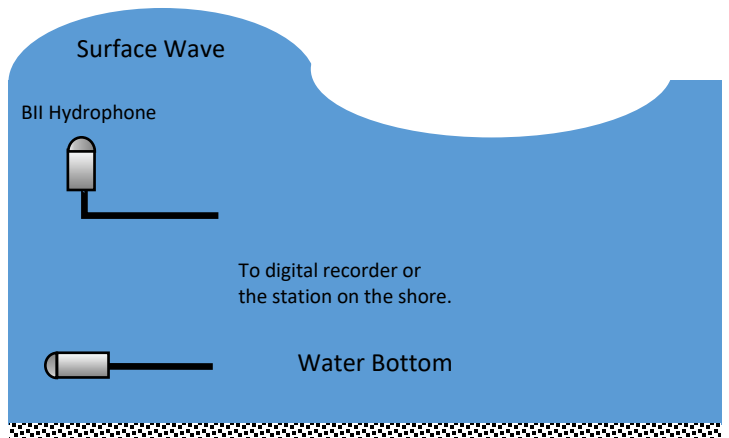
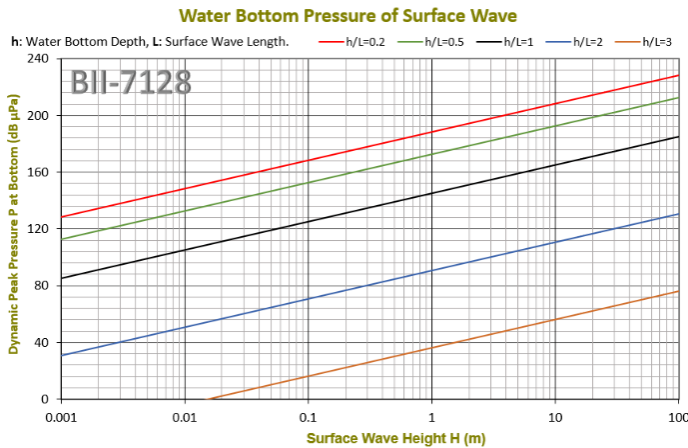
Noise Density (Referred to Input):



Directivity Pattern:

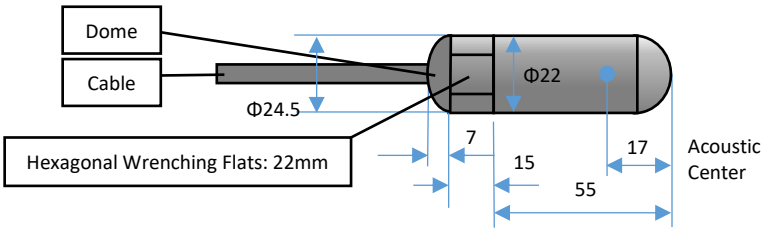


Wave-height sensors: Water-Bottom Dynamic Pressure of Surface Wave. Linear and nonlinear wave theories show that wave and tide parameters (height, period, energy, steepness, spectrum) can be deduced from the pressure time series measured over a time period under the progressive surface waves. BII7128 measures the dynamic pressures associated with progressive surface waves in field or laboratory and have no response to hydrostatic pressure.



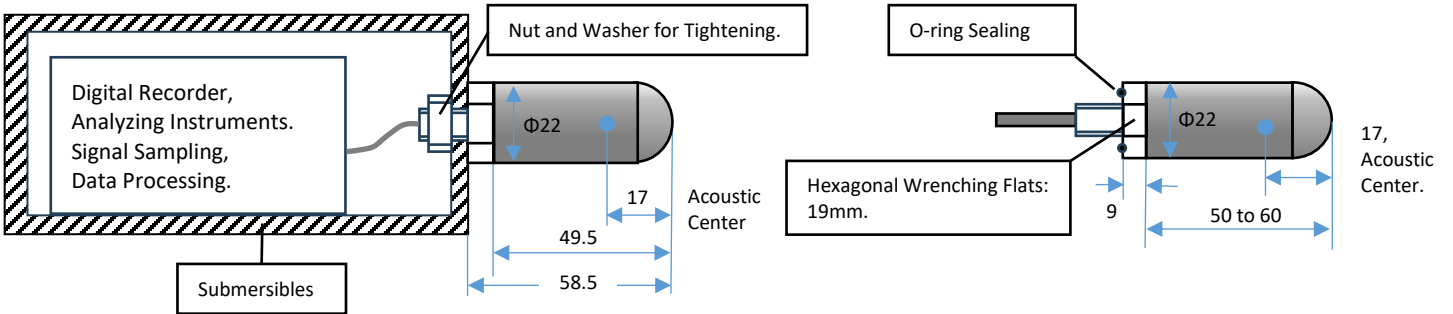
Customized BII7128-custom with Small Body Size.

1. Free Hanging with Smooth Domes.

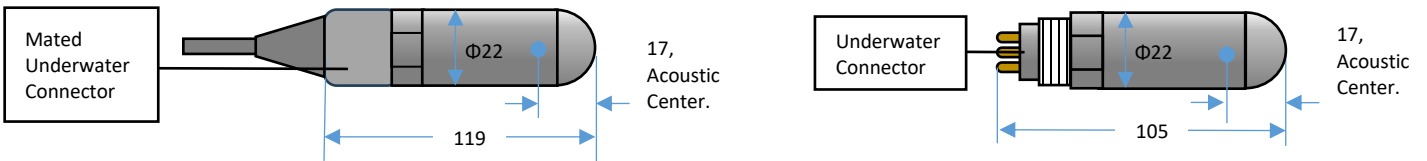


The hydrophone body has streamlined hemispherical domes which minimize the drag forces and the hydrodynamic noise caused by the hydrophone in motion or the flow past the hydrophone.

2. Thru-hole Inch Mounting with Single O-ring Sealing (THISO) 7/16"-20x22 UNF-2A.

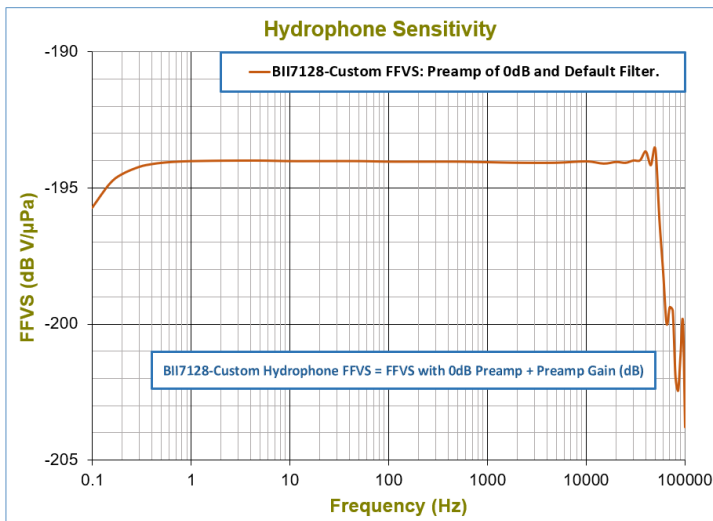


2. Free-hanging with Underwater Connector (FHUWC), 4 Pins (Fixed Sensitivity), 6 Pins (Programmable Sensitivity)

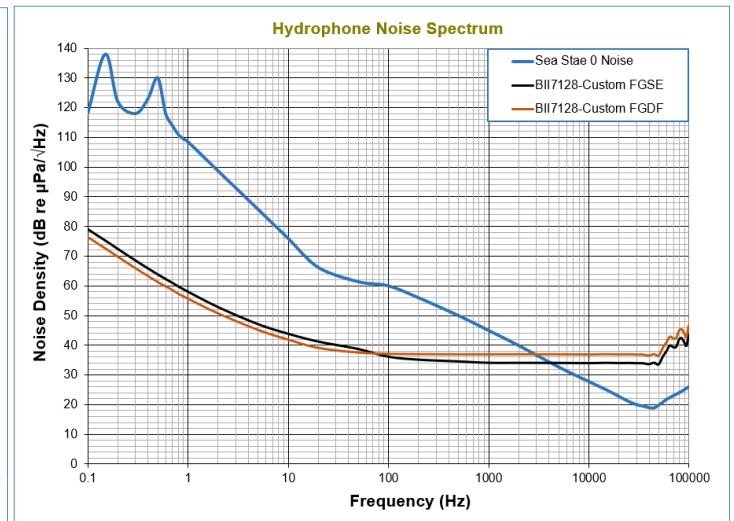


3. More Mounting/Installation Options: Please refer to online document [AcousticSystem.pdf](#) for a complete list of Mounting Options and details.

Free-field Voltage Response (FFVS):



Pressure Noise Density (RTI, referred to the input):



Directivity Response Pattern

