Benthowave Instrument Inc.

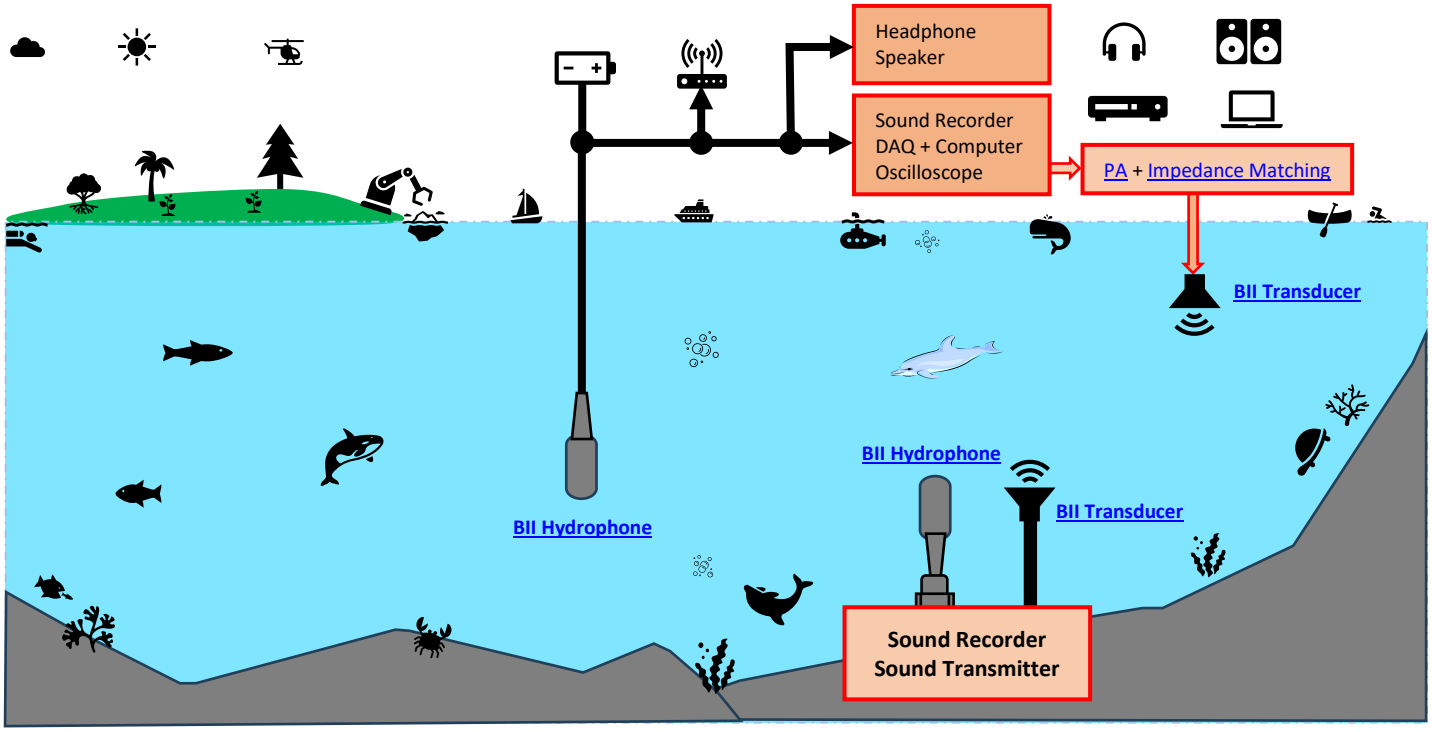
SE=SL-TL+AG-NL | Underwater Sound Solutions | benthowave.com | Revised on 2025/05/01

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

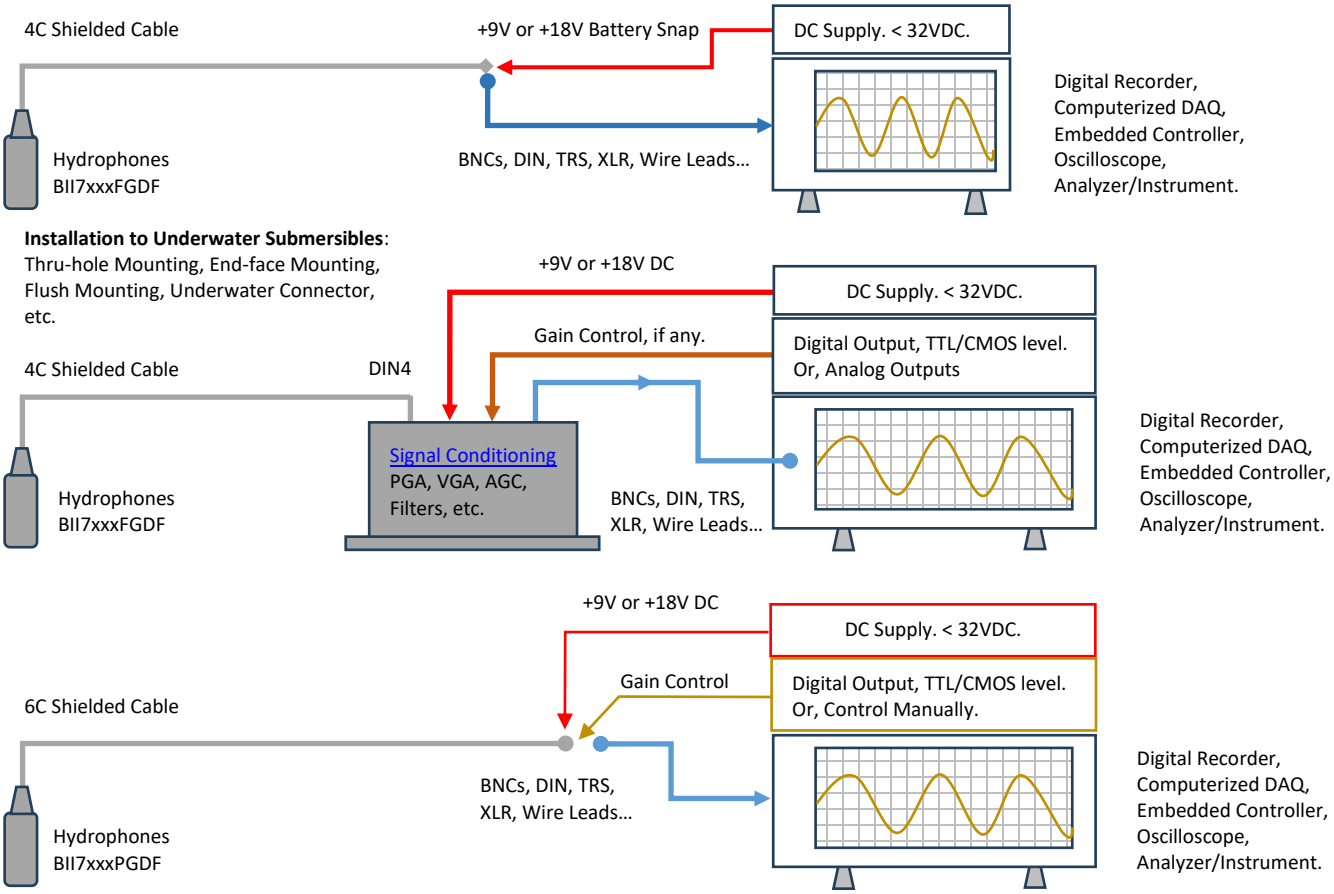
How do I set up my professional sound recorders to work with BII Hydrophones?

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).

System Configuration of Receiving Sounds and Waves.



Specification

FG: **F**ixed **G**ain; **PG:** **P**rogrammable **G**ain; **DF:** **D**ifferential Output; **SE:** **S**ingle **E**nded Output; **BPF**: **B**and **P**ass **F**ilter; **HPF**: **H**igh **P**ass **F**ilter; **LPF**: **L**ow **P**ass **F**ilter.				
Part Number:	**BII7128FGDF**	**BII7128PGDF**	**BII7128FGDF-DW**	**BII7128PGDF-DW**
Sensitivity FFVS @ 1 kHz: ± 2 dB V/µPa.	-191.0 + Preamp Gain.	-191.0 + Preamp Gain.	-189.0 + Preamp Gain.	-189.0 + Preamp Gain.
	-160.0 dB V/µPa.	-180.0, -140.0 dB V/µPa.	-160.0 dB V/µPa.	-180.0, -140.0 dB V/µPa.
FFVS:	Bespoke, Refer to Graph of **FFVS vs. Frequency**. Free-field Voltage Sensitivity.			
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 vs. pressure field underwater in the case of the hydrophone is used to measure surface wave heights.				
Pressure Noise Density:	Refer to Graph of **Pressure Noise Density**, Referred to Input (RTI), in µPa/√Hz**.**			
Built-in Filters: at -3dB V/µPa.	Bespoke HPF, First Order.	Bespoke HPF or BPF. HPF: 1st Order, LPF: 2nd Order.	Bespoke HPF, First Order.	Bespoke HPF or BPF. HPF: 1st Order, LPF: 2nd Order.
	Minimum HPF: 0.03 Hz.	Minimum HPF: 0.05 Hz.	Minimum HPF: 0.16 Hz.	Minimum HPF: 0.3 Hz.
	in Water: 0.03 Hz ~ 30 kHz	in Water: 0.05 Hz ~ 30 kHz	in Water: 0.16 Hz ~ 40 kHz	in Water: 0.3 Hz ~ 40 kHz
	in Air: 0.03 Hz ~ 3.5 kHz	in Air: 0.05 Hz ~ 3.5 kHz	in Air: 0.16 Hz ~ 3.5 kHz	in Air: 0.3 Hz ~ 3.5 kHz
	1. Reduce Noise. Both ocean ambient noises and the self-noises of electronic devices decrease when frequency increases. It is recommended to choose a built-in high pass filter to reject noises in low frequency range. For example, if you are interested in the signals greater than 100 Hz, you may specify a high pass filter with -3dB cut-off frequency at 10 Hz to improve signal to noise ratio of the signals of the interest. 2. 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, it is recommended to specify a high pass filter to avoid hydrophone saturation in these low frequency ranges.			
Preamp Gain:	31 dB.	11 and 51 dB.	29 dB.	9 and 49 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.			
Gain Selection:	No	**Yes**	No	**Yes**
Gain Selection Voltage:	CMOS/TTL Compatible. **Logic Low 0**: Gain Selection Wire to COM, or 0 to +0.8 VDC. **Logic High 1**: Gain Selection Wire Open, or +2.4 VDC to V_s.			
-3dB Beam Width:	Omnidirectional and Toroidal. Refer to **Graph of Directivity Pattern**.			
Output Type:	Differential	Differential	Differential	Differential
	To reject Electromagnetic Interference (EMI) over long cable, the differential (balanced) output is recommended.			
Maximum Output V_{omax}:	V_s – 1.1, Vpp.	V_s – 1.2, Vpp.	V_s – 1.1, Vpp.	V_s – 1.2, Vpp.
Overload Pressure Level:	20*log(V_{omax}/2.828) – Sensitivity, in dB µPa. Refer to the chart of Overload Pressure Level (**OPL**).			
Acceleration Sensitivity:	120.5 dB µPa/(m/s²) at Acoustic Axis. ≤ 118 dB µPa/(m/s²) at other directions.			

Operating Depth:	≤150 m or 1.5 MPa	≤150 m or 1.5 MPa	≤350 m or 3.5 MPa	≤350 m or 3.5 MPa
	Limited by the cable length if the cable has wire leads or a non-waterproof connector.			
Mounting Options:	1. Default: Free Hanging (**FH**). 2. Free-hanging with Male Underwater Connector (**FHUWC-4P or FHUWC-6P**). 3. Thru-hole Inch Mounting with Single O-ring Sealing (**THM-7/16"**). 4. Thru-hole Inch Mounting with Double O-ring Sealing (**THDO-7/16"**). 5. Bolt Fastening Mounting (Plastics) (**BFMP-NPT3/8"**). 6. Bolt Fastening Mounting (Stainless Steel) (**BFM-7/16" or BFM-5/8".**).			
	Please refer to online document AcousticSystem.pdf for a complete list of Mounting Options and more details.			
Shielded Cable (**SC**):	Four Conductor	Six Conductor	Four Conductor	Six Conductor
Cable Length:	1. Default: 20m (65.6ft) for Non-Underwater Connector; 0.6m (2ft) for Underwater Connectors. 2. Custom-fit Cable Length up to 305 m or 1000 ft. refer to Hydrophone Cable Length.			
Connector:	1. Default: Wire Leads (**WL**) 2. Two Male BNCs (**BNC**) (Max. Diameter Φ14.3 mm) for Output+ and Output- Signals. 3. DIN Receptacle with 3 Male Pins (**DIN3**), (Max. Diameter Φ17 mm). DIN Receptacle with 4 Male Pins (**DIN4**), (Max. Diameter Φ17 mm). DIN Receptacle with 6 Male Pins (**DIN6**), (Max. Diameter Φ17 mm). 4. 1/8" (3.5mm) TRS Plug (**TRS**) (Max. Diameter Φ10.5 mm). 5. 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). 6. Underwater Mateable Connector (4 pins) (**UMC4P**) (Max. Diameter Φ21.5 to Φ35 mm). Underwater Mateable Connector (6 pins) (**UMC6P**) (Max. Diameter Φ21.5 to Φ35 mm). **UMC** is from global manufacturers of underwater connectors. Its part number is listed in quote in detail.			
	7. +9VDC Battery Snap (**BS**), for +9VDC or +18VDC power supply. 8. 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):	1.05 mA	19.5 mA	1.05 mA	19.5 mA
Supply Voltage Vs:	+4.5 to +32 VDC.	+9 to +32 VDC	+4.5 to +32 VDC.	+9 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:	≥ 0.76 kg with 20m 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.				

How to Order Standard Hydrophones. BII Keeps Standard Products in Stock**.**

FG: Fixed Gain; **PG:** Programmable Gain; **DF:** Differential Output; **BPF**: Band Pass Filter; **HPF**: High Pass Filter; **LPF**: Low Pass Filter.

Part Number	**-Preamp Gain**	**-HPF Filter**	**-Mounting**	**-Cable Length**	**-Connectors for Signal/Gain Selection**	**/DC Supply**
BII7128FGDF	31 dB.	0.03 Hz.	FH: Free Hanging.	20 m (65.6 ft)	Connector Options for Signals, Gain Selection, and DC Supply.	
BII7128PGDF	11/51 dB.	0.05 Hz.				
BII7128FGDF-DW	29 dB.	0.16 Hz.				
BII7128PGDF-DW	9/49 dB.	0.30 Hz.				

Example of Part Number:	**Description**
BII7128FGDF-31dB-0.03Hz-FH-20m-WL	BII7128FGDF Hydrophone, 31dB Gain, High Pass Filter: 0.03Hz, Free Hanging, 20m Shielded Cable, Connector: None, Wire leads.
BII7128FGDF-31dB-0.03Hz-FH-20m-BNC/BS	BII7128FGDF Hydrophone, 31dB Gain, High Pass Filter: 0.03Hz, Free Hanging, 20m Shielded Cable, Connector: Two BNC Male for Output+ and Output- Signals, 9V Battery Snaps for DC Supply.
BII7128FGDF-31dB-0.03Hz-FH-20m-XLR3/BS	BII7128FGDF Hydrophone, 31dB Gain, High Pass Filter: 0.03Hz, Free Hanging, 20m Shielded Cable, Connector: XLR3 for Signal, 9V Battery Snaps for DC Supply.
BII7128FGDF-31dB-0.03Hz-FH-20m-XLR4	BII7128FGDF Hydrophone, 31dB Gain, High Pass Filter: 0.03Hz, Free Hanging, 20m Shielded Cable, Connector: XLR4 for Signals and DC Power Supply.
BII7128PGDF-11/51dB-0.05Hz-FH-20m-WL	BII7128PGDF Hydrophone, 11/51dB Gain, High Pass Filter: 0.05Hz, Free Hanging, 20m Shielded Cable, Connector: None, Wire leads.
BII7128PGDF-11/51dB-0.05Hz-FH-20m-XLR3/WL/BS	BII7128PGDF Hydrophone, 11/51dB Gain, High Pass Filter: 0.05Hz, Free Hanging, 20m Shielded Cable, Connector: XLR3 for Signal, Wire Leads for Gain Selection, 9V Battery Snaps for DC Supply.
BII7128PGDF-11/51dB-0.05Hz-FH-20m-XLR6	BII7128PGDF Hydrophone, 11/51dB Gain, High Pass Filter: 0.05Hz, Free Hanging, 20m Shielded Cable, Connector: XLR6 for Signals, Gain Selection, and DC Power Supply.

How to Order Bespoke Hydrophones. Non-stock.

FG: Fixed Gain; **PG:** Programmable Gain; **DF:** Differential Output; **SE:** Single Ended Output; **BPF**: Band Pass Filter; **HPF**: High Pass Filter; **LPF**: Low Pass Filter.

Part Number	**-Preamp Gain**	-HPF or BPF Filter	-Mounting	-Cable Length	**-Connectors for Signal/Gain Selection**	**/DC Supply**
BII7128FGDF	31 dB.	-3dB frequency, in Hz, kHz.	Mounting Options.	in meter. Up to 200 m or 656 ft.	Connector Options for Signals, Gain Selection, and DC Supply.	
BII7128PGDF	11/51 dB.					
BII7128FGDF-DW	29 dB.					
BII7128PGDF-DW	9/49 dB.					

Example of Part Number:	**Description**
BII7128FGDF-31dB-10Hz-FH-30m-WL	BII7128FGDF Hydrophone, 31dB Gain, High Pass Filter: 10Hz, Free Hanging, 30m Shielded Cable, Connector: none, Wire leads.

BII7128FGDF-31dB-10Hz-FH-30m-BNC/BS	BII7128FGDF Hydrophone, 31dB Gain, High Pass Filter: 10Hz, Free Hanging, 30m Shielded Cable, Connector: Two BNC Male for Output+ and Output- Signals, 9V Battery Snaps for DC Supply.
BII7128FGDF-31dB-10Hz-BFM-7/16"-100m-XLR3/BS	BII7128FGDF Hydrophone, 31dB Gain, High Pass Filter: 10Hz, Bolt Fastening Mounting BFM-7/16", 100m Shielded Cable, Connector: 3-pin XLR for Signals and Battery Snap for +9VDC Batteries.
BII7128FGDF-31dB-10Hz-FH-0.6m-UMC4P	BII7128FGDF Hydrophone, 31dB Gain, High Pass Filter: 10Hz, Free Hanging, 0.6m Shielded Cable, Connector: 4-pin Underwater Mateable Connector for Signals and DC Power Supply.
BII7128PGDF-11/51dB-10Hz-FH-30m-WL	BII7128PGDF Hydrophone, 11/51dB Gain, High Pass Filter: 10Hz, Free Hanging, 30m Shielded Cable, Connector: none, Wire leads.
BII7128PGDF-11/51dB-1Hz/20kHz-BFM-7/16"-100m-XLR3/WL/BS	BII7128PGDF Hydrophone, 11/51dB Gain, Band Pass Filter: 1Hz to 20kHz, Bolt Fastening Mounting BFM-7/16", 100m Shielded Cable, Connector: 3-pin XLR for Signals, Wire Leads for Gain Selection, and Battery Snap for +9VDC Batteries.
BII7128PGDF-11/51dB-10Hz-FH-0.6m-UMC6P	BII7128PGDF Hydrophone, 11/51dB Gain, High Pass Filter: 10Hz, Free Hanging, 0.6m Shielded Cable, Connector: 6-pin Underwater Mateable Connector for Signals, Gain Selection, and DC Power Supply.

Wiring Information of Hydrophones with Fixed-gain Preamps:

Differential Output:	Wire Leads	UMC4P/XLR4P	DIN4P	DIN3/XLR3 + 9V BS		BNC + 9V BS	TRS + 9V BS
+VDC	Red	Pin 3	Pin 4	Battery Female Snap		Battery Female Snap	Battery Female Snap
Common	Black	Pin 1	Pin 1	Battery Male Snap		Battery Male Snap	Battery Male Snap
Signal+	White	Pin 2	Pin 3	DIN3 Pin 3	TRS Tip	#1 BNC Center	TRS Tip
Signal-	Blue, Green, or Yellow	Pin 4	Pin 2	DIN3 Pin 1	TRS Ring	#2 BNC Center	TRS Ring
Signal Common	Black	Pin 1	Pin 1	DIN3 Pin 2	TRS Sleeve	BNC Shell	TRS Sleeve
Shielding	Shield	Metal Shell	Metal Shell	DIN3 and XLR3 Metal Shell		N/A	N/A

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

Differential Output:	Wire Leads	UMC6P/XLR6	DIN6	BNC + 9V BS	DIN3/XLR3 + 9V BS		TRS + 9V BS
+VDC	Red	Pin 3	Pin 4	Battery Female Snap	Battery Female Snap		Battery Female Snap
Common	Black	Pin 1	Pin 1	Battery Male Snap, BNC Shield.	Battery Male Snap, DIN Pin 2 or XLR Pin 1.		Battery Male Snap, TRS Sleeve.
Output Signal+	White	Pin 2	Pin 3	"1" BNC Center Pin	DIN Pin 3	XLR Pin 2	TRS Tip
Output Signal -	Green	Pin 4	Pin 2	"2" BNC Center Pin	DIN Pin 1	XLR Pin 3	TRS Ring
Digital A0	Blue	Pin 6	Pin 5	Blue	Blue		Blue
Digital Common	Yellow or Brown	Pin 5	Pin 6	Yellow or Brown	Yellow or Brown		Yellow or Brown
Shielding	Shield	Metal Shell	Metal Shell	BNC Shield	Metal Shell		N/A

Selecting Sensitivity of One-bit Digitally Programmable		
FFVS Selection Wire A0	**BII7128PGDF Hydrophone Sensitivity FFVS at 1kHz.**	**BII7128PGDF-DW Hydrophone Sensitivity FFVS at 1kHz.**
0 (Logic Low)	-191 + 10 dB V/µPa.	-189 + 10 dB V/µPa.
1 (Logic High)	-191 + 50 dB V/µPa.	-189 + 50 dB V/µPa.

Question:

What if the mating connector of my DAQ module or recording device is NOT available from BII? A bespoke connector adaptor might be assembled by BII and BII ships the adaptor to buyer as accessory of the device. Please contact BII for customizations. Many adaptors for standard connectors are available in worldwide electronic suppliers such as BNC to SMA, BNC to SMC, XLR to TRS, etc. Check out your local suppliers.

Is impedance matching necessary between hydrophones/sensors and preamplifiers/Recorders/Analyzers? it is NOT necessary to do impedance matching in low frequency range applications in which electromagnetic wave lengths are much greater than the cable length. High frequency transducers such as NDT pulsing transducers need 50Ω impedance matching among transducers, cables, and analyzers/digitizers.

My acoustic sensors generate differential signals in MHz range, are TRS connectors suitable for my applications? BII's test shows TRS connectors (Plug and Jack) of BII preamps can be used up to 20 MHz. Test Conditions: TRS Jack with 0.2m cable and TRS plug with 1m cable. Oscilloscope: 1MΩ||20pF, Signal Source: DDS Signal Generator.

Can 3.5mm (1/8") TRS be configured for single-ended signal of a hydrophone/transducer which does not have built-in preamplifier? Yes, the preamp with differential-input TRS can accept single-ended signals from hydrophones/transducers whose TRS wiring should be like followings: **TRS Tip**: Signal. **TRS Ring and Sleeve:** Both terminals are soldered together for Signal Common and Shielding. Common and shielding should be "one-point" contact.

Can BII explain why the capacitance of my hydrophone/transducer affect high pass filtering? (1). Hydrophone/transducer is high impedance devices in low frequency range. Its simplified complex impedance = $j/(2\pi f C_h)$, C_h is the capacitance of hydrophone/transducer, f is frequency in Hz. This impedance is in series with preamp R_i and can reach several MΩ to hundreds MΩ depending on C_h and f. (2). Most high-performance operational amplifiers (IC chips) can use input resistors R_i up to 1 to 200 MΩ to avoid bumping into saturation issue.

Can the 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.
(1) The terminal of unused output MUST be insulated to avoid short circuit.
(2) Neither output+ nor output – of the hydrophone can be wired to common which is going to destroy the hydrophone by short circuit.

How do I use a programmable sensitivity hydrophone as a fixed sensitivity hydrophone?
When a **Gain Selection wire** is short to **Digital Common**, its digital logic is Low or "0. The gain of the built-in preamp is set to 10dB or low gain.
When a **Gain Selection wire** is floating or open, its digital logic is High or "1". The gain of the built-in preamp is set to 50dB or high gain.
The unused terminals and bare splice wire leads MUST be insulated to avoid short circuit.

What if the connector of my analyzer (instrument) is SMA or SMC Connector? Buyer may order a SMA (or SMC) to BNC (Male) adaptor from local electronic distributors in buyer's country. BII may ship the adaptor as accessory of the device if buyer requests when ordering. **By default, BII does NOT supply the adaptor as accessories.**

How to increase hydrophone sensitivity for extremely weak sounds?

BII low noise hydrophone with built-in preamp (Differential Output) -> Long Cable -> Standalone Preamp -> Analyzing Instrument or Recorder.

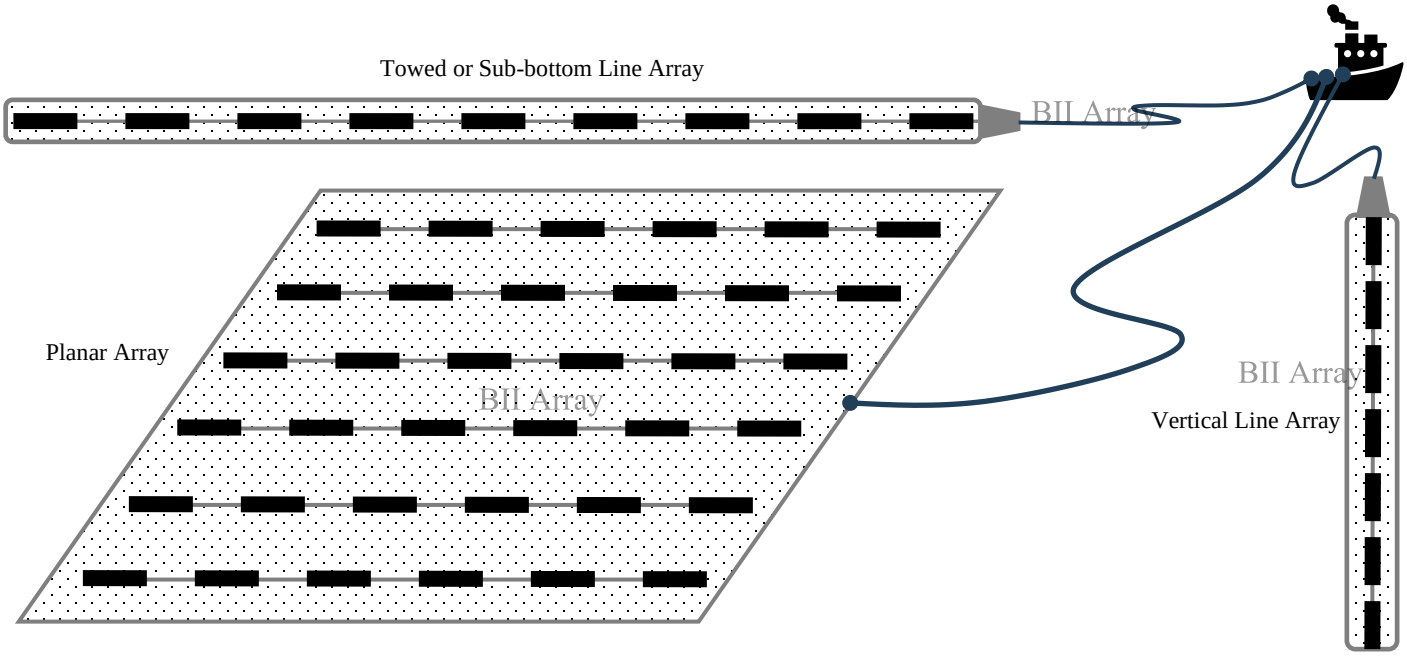
What components are necessary to compensate the propagation and spreading loss?

A low noise hydrophone + PGA amplifier with gain of 0/20/40/60 dB.
A low noise hydrophone + VGA amplifier with gain of 0 ~ 70 dB.
A low noise hydrophone + AGC amplifier with gain of -20 ~ 80dB.

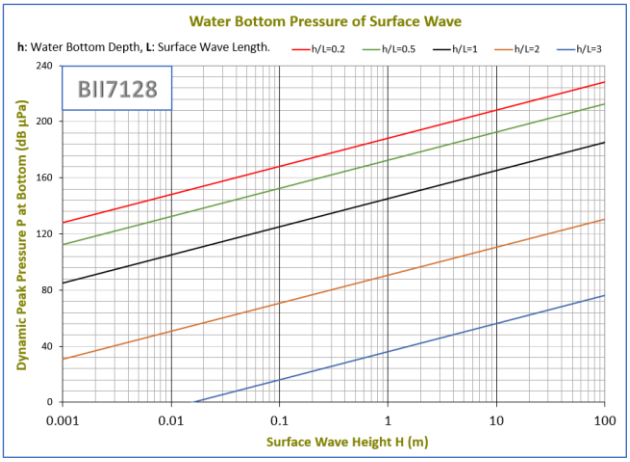
How do I use Gain Selection wires of a Programmable Sensitivity Hydrophone in field?

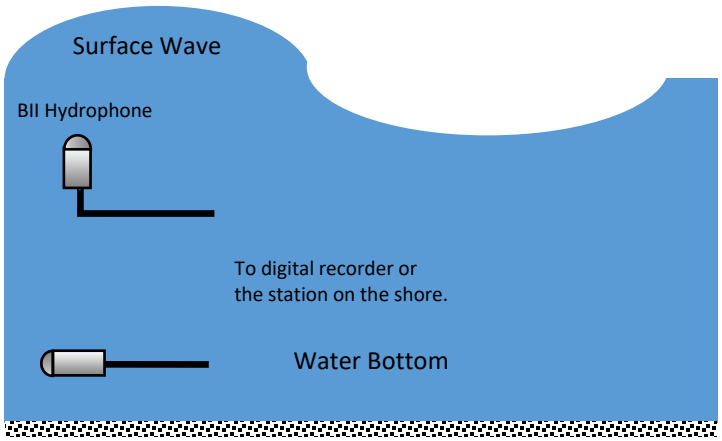
(1). **Manual Gain Selection.**
When a **Gain Selection wire** is floating or open, its digital logic is High or "1". When a **Gain Selection wire** is short to **Digital Common**, its digital logic is Low or "0". Sensitivity of a Hydrophone is fixed when its Gain Selection wires are fixed to **Digital Common** or open (floating) during operation.
(2). **Gain Selection with Digital Outputs.** Digital Outputs of a DAQ (data acquisition device) select gains with TTL/CMOS logic levels.

Array Elements for Underwater Linear and Planar Arrays



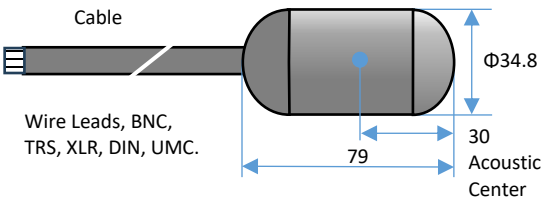
Wave-height sensors: Water-Bottom Dynamic Pressure of Surface Wave. Linear and nonlinear wave theories show that wave and tide parameters (height, period, energy, steepness, spectrum) can be deduced from the pressure time series measured over a time period under the progressive surface waves. BII7128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



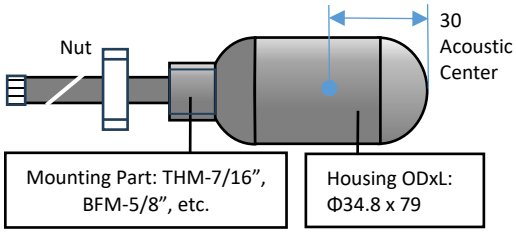


Physical Size (Dimensional Unit: mm): The overall length varies with the length of the built-in preamplifier and mounting parts. The Scale is NOT 1:1.

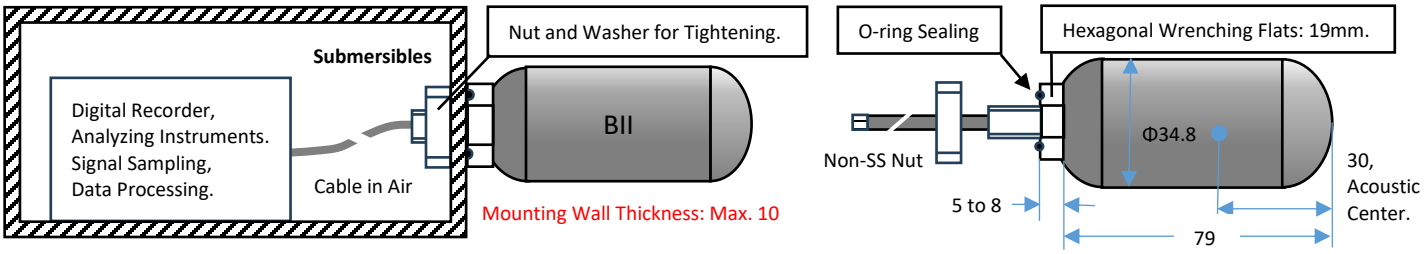
1. Size information of Free Hanging.



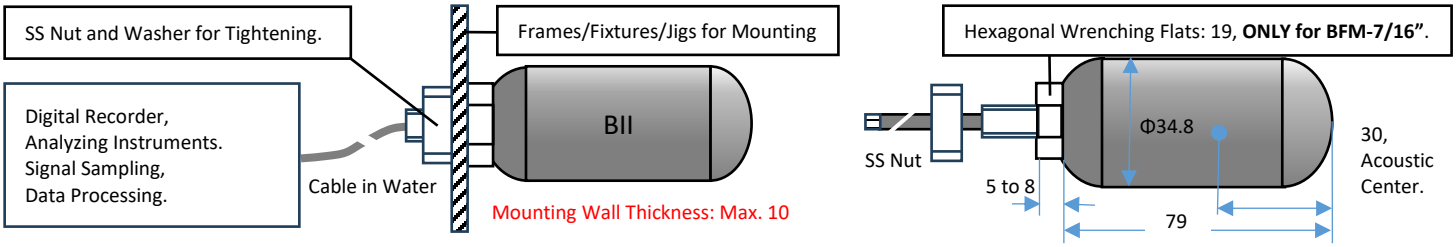
General Size information.



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

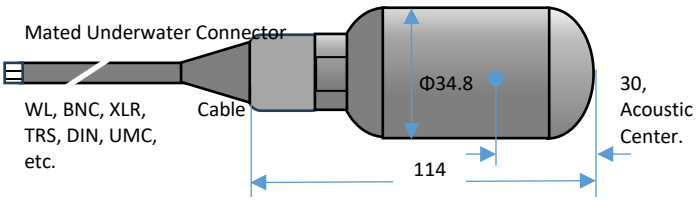


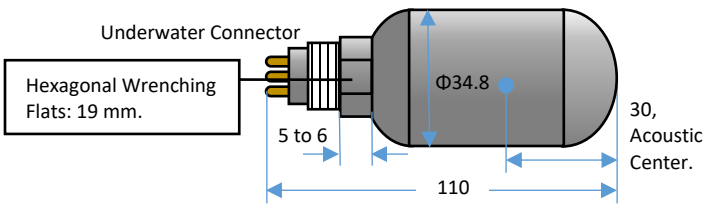
3. Bolt-Fastening Mounting BFM-7/16” (7/16"-20x22 UNF-2A), and BFM-5/8” (5/8"-18x22 UNF-2A, BFM-5/8” does NOT possess Hexagonal Wrenching Flats.).



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

Mating Connector and Cable	**UWC-Cable Length-Connector:** Underwater Connector with Socket insert and Internal-Thread Mating Parts, customized-length shielded cable, a Connector (WL, XLR, TRS, DIN, MIL, UMC, etc.) to DAQ devices or Digital Recorders.
	How to order cable with mating underwater connector? for example: **UMC4S-20m-WL:** 20 m cable with Underwater Mateable Connector 4 Sockets (**UMC4S**) on one end and wire leads (**WL**) on other end. **UMC4S-20m-XLR3/BS**: 20 m cable with and Underwater Mateable Connector 4 Sockets (**UMC4S**) on one end and XLR Receptacle with 3 Male Pins (**XLR3**) and Two +9V Battery Snaps on other end.

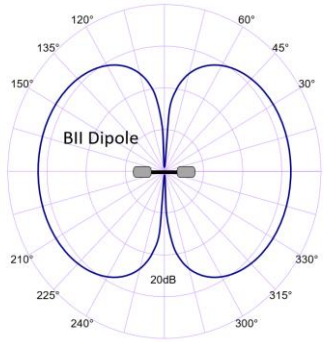


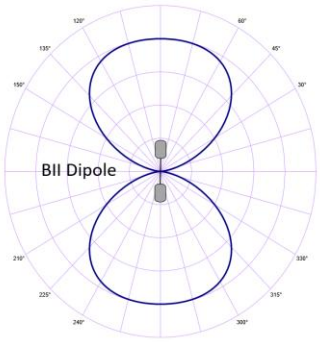


5. More Mounting/Installation Options: Please refer to online document AcousticSystem.pdf for a complete list of Mounting Options and details.

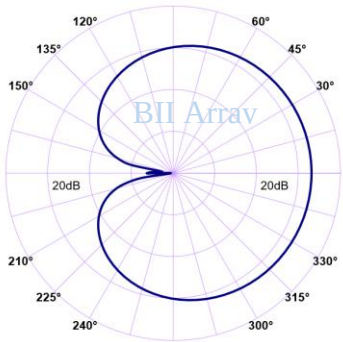
Simple Array Consisting of 2 or 3 Hydrophones.

“Figure 8” Pattern of a Dipole (Pressure-Gradient).

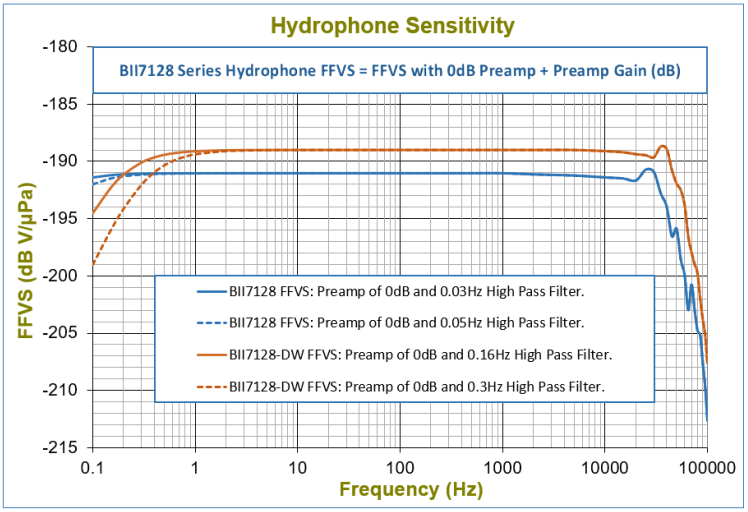




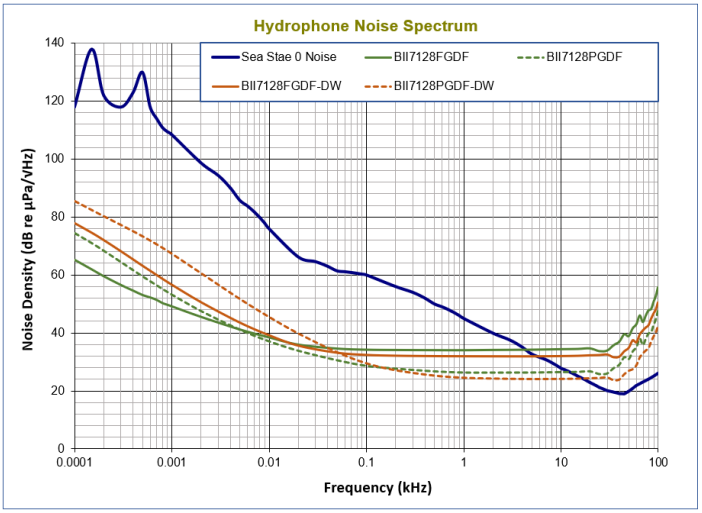
Cardioid Pattern= Pressure Hydrophone + Dipole.



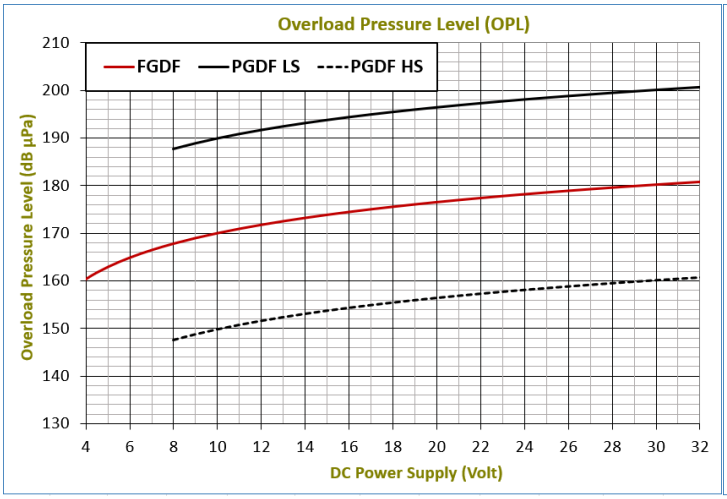
Free-field Voltage Sensitivity:



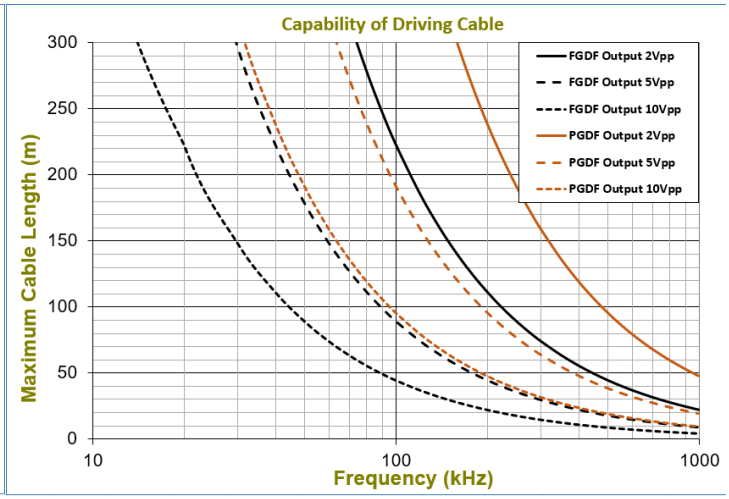
Noise Density (Referred to Input):



Overload Pressure Level (OPL), LS: Low Sensitivity, HS: High Sensitivity.



Hydrophone Cable Length



Directivity Pattern: