BII-7128 hydrophones measure low frequency underwater sounds and pressure fluctuations down to 0.01 Hz: Surface Waves, Turbulences, seismic, ocean traffics, industrial noises, precipitations, biologics, etc. Small size and streamlined hemispherical dome avoid interferences to the pressure field under test and ensure the measurement accuracy. A spatial array of multiple hydrophones can be set up for directional measurement system.

The hydrophones come with integrated preamplifiers, which can drive cable up to 200m without significant signal loss, and underwater mateable connectors, BNC or audio connectors for underwater acoustic recording systems such as digital recorders, DAQs (A/D Converter) and Oscilloscopes, etc. The housing is corrosion resistant plastics, and the mounting parts include corrosion resistant plastics and stainless steel metals.

**Suggested Application**

| Noise Measurement | Surface Waves, Turbulences, seismic, ocean traffics, precipitations, biologics... |
| Coastal/Offshore Processes, Engineering & Management | Wave-Structure Interaction, Wave-induced Forces upon Structures |
| Wave-height Sensor, Wave and Tide Recorder/Logger | Evaluation of Wave Parameters: Energy, Height, Period, Spectrum... |

### Specification

<table>
<thead>
<tr>
<th>Wave Height Sensor</th>
<th>BII-7128FG</th>
<th>BII-7128PG</th>
</tr>
</thead>
<tbody>
<tr>
<td>Sensitivity at 1kHz</td>
<td>-192 + Preamp Gain, ± 2 dB, in dB V/μPa.</td>
<td>Programmed Gain Preamp:</td>
</tr>
<tr>
<td>Usable Frequency in Water:</td>
<td>0.01 Hz ~ 40 kHz at ± 3 dB V/μPa.</td>
<td>a. Default: 0, 20, 40, 60 dB.</td>
</tr>
<tr>
<td>Usable Frequency in Air:</td>
<td>0.01 Hz ~ 3.5 kHz at -3dB V/μPa.</td>
<td>b. Customized: 20, 40, 60, 80 dB.</td>
</tr>
<tr>
<td>Wave Height:</td>
<td>0.001 to 100 m. Refer to Graph of Water-Bottom Dynamic Pressure of Surface Wave.</td>
<td></td>
</tr>
</tbody>
</table>

**Disclaimer:** BII calibrates sensitivity of the hydrophone in dB V/μPa. It is buyer’s responsibility and liability to get the relationship between wave height and its pressure field underwater in the case of the hydrophone is used to measure surface wave heights.

**Directivity Pattern:** Omnidirectional and Toroidal, Refer to Graph of Beam Pattern.

**Pressure Noise Density:** Refer to Graph of Pressure Noise Density, Referred to Input (RTI), in μPa/VHz.

**Bespoke Preamplifier Gain (dB):**

- Fixed Gain Preamp: 0, 20, 40, 60 dB.
- Customized Gain: 20, 40, 60, 80 dB.

**Gain Selection Voltage (Programmable Gain Preamp):**

- N/A
- CMOS/TTL Compatible

**Built-in Filters:** Bespoke Band Pass filter. Specify when ordering.

**Output Type:**

- Single Ended or Differential. Specify when ordering.
  - 2. Differential Output (DF), Append DF to the listed part number.

**Maximum Output $V_{\text{max}}$:**

- Preamplifier dependent. $V_{\text{max}} = (\text{Supply Voltage Vs} \times 1.0) \text{ to } (\text{Supply Voltage Vs} \times 4.0)$, in Vpp.

**Overload Pressure Level:**

- 192 or $[20\times\log(V_{\text{max}}/2.828)] \text{ – Sensitivity}$, whichever is less, in dB μPa.

**Maximum Operating Depth:**

- 100 m and limited by the cable length if the cable has wire leads or a non-waterproof connector.

**Mounting Options:**

1. Free Hanging (FH)
2. Free-hanging with Male Underwater Connector (FHUWC)
3. Thru-hole Mounting with Single O-ring (THSO)
4. Thru-hole Mounting with Double O-ring (THDO)
5. Bolt Fastening Mounting (Plastics): (BFMP)
6. Bolt Fastening Mounting (Stainless Steel): (BFMSS)
7. End Face Mount (O-ring Sealing) (EFMS)
8. Flush Mounting: (FSM)

Please refer to online document AcousticSystem.pdf for a complete list of Mounting Options and more details.

**Cable:**

- Four Conductor Shielded Cable (SC)
- Six Conductor Shielded Cable (SC)

**Cable Length:**

- 1. Default: 10 m; 2. Custom-fit Cable Length, up to 200 m.

**Connector:**

- 1. Default: Wire Leads (WL)
- 2. Male BNC (BNC)
- 3. SMA (Plug, Male Pin) (SMA)
- 4. SMC (Plug, Female Socket) (SMC)
- 5. 1/8" (3.5mm) TRS Plug (TR535)
- 6. XLR (pin) (XLR)
- 7. MIL-5015 Style (pin) (5015)
- 8. LEMO (Plug Male Pins) (LEMO)
- 9. Underwater Mateable Connector (pin) (UMC)
- 10. +9VDC Battery Snap (BS) (Exclusive to preamplified hydrophone)
- 11. Customized, buyer specifies the connector.

Note: Underwater Mateable Connector is for uses underwater. Other connectors and wire leads are for dry uses and are not waterproofed.

**Supply Voltage Vs:**

- +4.5 to +30 VDC, Preamplifier dependent.

**Suggested DC Supply:**

- +9VDC 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.

**Current (Quiescent):**

- 0.4 to 12 mA, Preamplifier dependent.
Wiring Information

### Wiring of Single Ended Output:

<table>
<thead>
<tr>
<th>BNC Male and 9V Battery Snap</th>
<th>Underwater Connector</th>
<th>XLR Plug and 9V Battery Snap</th>
<th>TRS Plug and 9V Battery Snap</th>
</tr>
</thead>
<tbody>
<tr>
<td>+VDC</td>
<td>Red</td>
<td>Pin 3</td>
<td>Battery Female Snap</td>
</tr>
<tr>
<td>Common</td>
<td>Black</td>
<td>Pin 1</td>
<td>Battery Male Snap</td>
</tr>
<tr>
<td>Digital Common</td>
<td>Black</td>
<td>Pin 2</td>
<td>Battery Female Snap</td>
</tr>
<tr>
<td>Digital A1 (Gain Selection)</td>
<td>Yellow or Brown</td>
<td>Pin 4</td>
<td>Battery Male Snap</td>
</tr>
<tr>
<td>Digital A0 (Gain Selection)</td>
<td>Blue</td>
<td>Pin 5</td>
<td>Battery Male Snap</td>
</tr>
<tr>
<td>Output Signal</td>
<td>White</td>
<td>Pin 6</td>
<td>Battery Female Snap</td>
</tr>
<tr>
<td>Output Signal Common</td>
<td>Green</td>
<td>Pin 3</td>
<td>Battery Male Snap</td>
</tr>
<tr>
<td>Shielding</td>
<td>Shield</td>
<td>N/A</td>
<td>N/A</td>
</tr>
<tr>
<td><strong>Wiring of Differential Output:</strong></td>
<td>Wire Leads</td>
<td>Underwater Connector</td>
<td>XLR + 9V Battery Snap</td>
</tr>
<tr>
<td>+VDC</td>
<td>Red</td>
<td>Pin 3</td>
<td>Battery Female Snap</td>
</tr>
<tr>
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<tr>
<td>Shielding</td>
<td>Shield</td>
<td>N/A</td>
<td>N/A</td>
</tr>
</tbody>
</table>

### Wiring Information with Fixed Gain Preamp

### Wiring Information with Programmable Gain Preamp

### Selecting Sensitivity of Digitally Programmable

### Gain Selection Wire A1 | Gain Selection Wire A0
---|---
0 (Logic Low) | 0 (Logic Low) | 192 + 0 or 20 dB V/μPa
0 (Logic Low) | 1 (Logic High) | 192 + 20 or 40 dB V/μPa
1 (Logic High) | 0 (Logic Low) | 192 + 40 or 60 dB V/μPa
1 (Logic High) | 1 (Logic High) | 192 + 60 or 80 dB V/μPa

### How to Order:

<table>
<thead>
<tr>
<th>Sensor</th>
<th>Gain Option</th>
<th>-Gain</th>
<th>-Output</th>
<th>-x/x</th>
<th>-Mounting</th>
<th>-Cable Length</th>
<th>-Cable</th>
<th>-Connector</th>
</tr>
</thead>
<tbody>
<tr>
<td>Part</td>
<td>Number</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>FG: Fixed Gain</td>
<td>Preamp Gain in dB</td>
<td>SE</td>
<td>DF</td>
<td>-3dB bandpass Filter Frequencies, in Hz</td>
<td>Refer to options.</td>
<td>in m</td>
<td>Refer to options.</td>
<td></td>
</tr>
<tr>
<td>PG: Programmable</td>
<td>Description</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**Example of Part Number:**

- **BII-7128FG-40dB-SE-0.1Hz/10kHz-THSO-0.15m-WCB-WL:** BII-7128 Sensor, Fixed Gain: 40dB Preamplifier, Single Ended Output, Band Pass Filter: 0.1Hz to 10kHz, Thrushole Mounting with Single O-ring, 0.15m Wire/Cable Bundle, Wire Leads.
- **BII-7128PG-SE-0.1Hz/1kHz-BFM55-30m-SC-WL/BNC/BS:** BII-7128 Sensor, Programmable Gain [20, 40, 60, 80dB], Single-ended Output, 0.1Hz to 1kHz Band Pass Filter, Bolt Fastening Mounting (Stainless Steel), 30m Shielded Cable, Wire Leads for Gain Control, BNC plug for Output Signal, +9V Battery Snap for Power 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.

Free-field Voltage Sensitivity (Bespoke):

- **Hydrophone Sensitivity**

Noise Density (Referred to Input):

- **Hydrophone Noise Spectrum**

Beam Pattern:

- **Vertical Beam XZ Plane**

- **Horizontal Beam XY Plane**

**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. BII-7128 measures the dynamic pressures associated with progressive surface waves in field or laboratory and have no response to hydrostatic pressure.

**Surface Wave**

- **BII Hydrophone**

  To digital recorder or the station on the shore.