Automatic Sensitivity Control Hydrophone

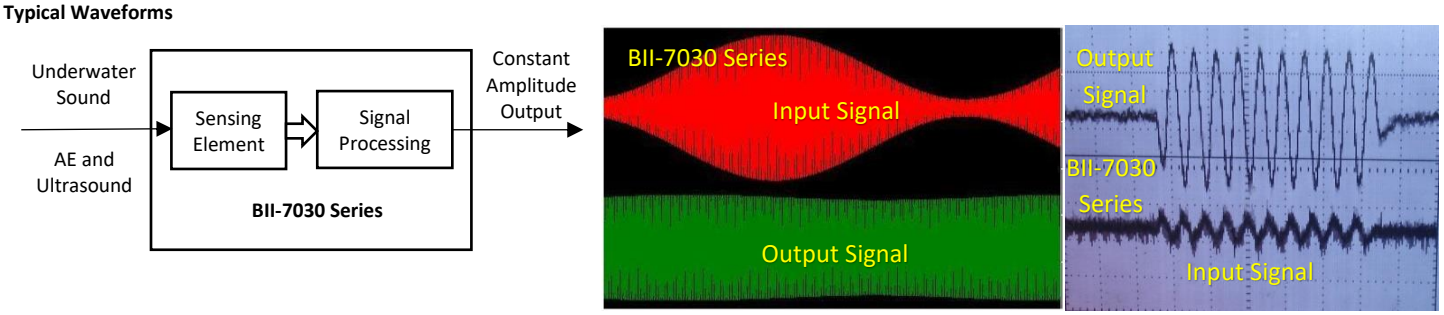
Automatic-Sensitivity-Control Hydrophone (ASCH, or Equalizing Hydrophone and Receiver): Dynamic Range 80dB for SONAR, NDT, and AE

BII-7030 series hydrophones (receivers) detect the information being carried on by signal frequencies, and not by signal levels (amplitudes) and phases such as Doppler sonar for speed measurement, ASK and FSK digital communication, etc...

The Automatic-Sensitivity-Control hydrophone maintains suitable (or constant) voltage amplitude at output despite the variations of the detected sound pressures by automatically reducing its sensitivity when the sound is strong and raising it when sound is weak. It has 80dB dynamic range to equalize the differences in received sound intensities emitted by different sound sources, amplitude variations in a single sound source due to fading or reduced power, as well as varying echo levels caused by sound propagation loss in SONAR and ultrasonic testing.

The built-in first order bandpass filter allows the receiver to detect the sound of the interest and reject the sounds out of its bandwidth.

Typical Waveforms



Typical Applications	
Compensate Propagation Loss & Target Strength	Search of Acoustic Beacons: Tag, Pinger and Locator
Underwater Digital and Voice Communication	Passive Acoustic Monitoring (PAM System)
Doppler SONAR, Echo Sounding	Pulsing Ultrasonic Testing

Specification

Part Number:	BII-7031
Usable Frequency:	20 Hz to 500 kHz.
Signal Type:	Continuous Signal (CW), Pulsed/Burst Signals, Chirp/FM, FSK, Frequency Hopping, etc...
Sensing Element FFVS:	Refer to BII-7000 series, BII-7010 Series, BII-7040 Series, BII-7070 Series, BII-7120 Series, BII-7190 Series, Other Hydrophones. Note: BII-7030 series hydrophones are upgrade models of the hydrophones listed above.
Directivity Pattern:	Custom-fit, specify when ordering. 1. Omnidirectional: refer to BII-7000 series. 2. Toroidal: refer to BII-7010 Series. 3. Hemispherical: refer to BII-7040 Series. 4. Conical: refer to BII-7070 Series. 5. Low Noise below Sea State 0: refer to BII-7120 Series. 6. Fan-shaped: refer to BII-7190 Series. 7. Other Hydrophones...
Input Dynamic Range:	80 dB
Sound Level Range ΔP_i:	110 to 190 dB µPa. Sound Level Range ΔP_i = Input Dynamic Range = 80 dB. Note: **minimum detection threshold** is limited by noise levels in passband, which include electronic self-noise of the hydrophone and ambient sound noises if the ambient sound noises are not the measurand. The wider passband is, the higher the noise level is.
Overload Pressure Level:	Refer to Sound Level Range P_i.
Pressure Noise (RTI) P_n:	Customized, roughly $P_n \approx$ (-162 – Sensitivity of Sensing Element) at f ≥ 1 kHz, in dB µPa/√Hz. **RTI**: Refer to Input. Equivalent pressure noise (RTI) P_n of less than 1 kHz is exponentially inversely proportional to 1/f and will be included in datasheet. Most sensitive element is used in BII-7120 series low noise hydrophone, and is around -182 dB V/µPa. Refer to the links in **Directivity Pattern** for typical sensitivities and RTI Equivalent pressure noise of different sensing elements.
Acceleration Sensitivity:	Refer to BII-7000 series, BII-7010 Series, BII-7040 Series, BII-7070 Series, BII-7120 Series, BII-7190 Series, Other Hydrophones.
Built-in Filters:	Bespoke First Order Band Pass filter. refer to **Usable Frequency.**
Output Type:	Single Ended
Output Level Error:	< ± 2.0 dB
Output Level V_o:	0.2 to 3.2 Vpp
Operating Depth:	Maximum 300 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)
Cable Length:	1. Default: 10 m. 2. Custom-fit Cable Length up to 305 m.
Connector:	1. Default: Wire Leads (WL)

	2. Male BNC (BNC) (Max. Diameter Φ14.3 mm). 3. SMA (Plug, Male Pin) (SMA), Voltage Rating: 335 V_{RMS} Continuous. (Max. Diameter Φ9.24 mm). 4. SMC (Plug, Female Socket) (SMC), Voltage Rating: 335 V_{RMS} Continuous. (SMC) (Max. Diameter Φ6.4 mm). 5. 1/8" (3.5mm) TRS Plug (TRS35) (Max. Diameter Φ10.5 mm). 6. XLR (pin) (XLR) (Max. Diameter Φ20.2 mm). 7. MIL-5015 Style (pin) (5015) (Max. Diameter Φ30 mm with 3 contacts). 8. LEMO (Plug Male Pins) (LEMO) (Max. Diameter Φ9.5 mm with 3 contacts). 9. Underwater Mateable Connector (pin) (UMC) (Max. Diameter Φ21.5 to Φ35 mm). 10. +9VDC Battery Snap (BS) 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:	+16 to +32 VDC
Suggested DC Supply:	+9VDC Batteries, 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):	17 mA @ +24 VDC
Size:	Custom-fit.
Weight:	≥ 0.55 kg with 10 m 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.

AE (Acoustic Emission) Applications: These hydrophones are tested and calibrated in water. It is buyer's responsibility and liability to calibrate and maintain the AE sensors according to the acoustic emission national standards of buyer's country.

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

Wiring of Single Ended Output:	**Wire Leads**	**BNC Male/SMA/SMC and 9V Battery Snap**	**Underwater Connector**	**XLR Plug and 9V Battery Snap**	**TRS Plug and 9V Battery Snap**
+VDC	Red	Female Snap	Pin 3	Battery Female Snap	Battery Female Snap
Common	Black	Male Snap	Pin 1	Battery Male Snap	Battery Male Snap
Signal	White	Center Pin or Contact	Pin 2	XLR Pin 2	TRS Tip
Signal Common	Blue, Green, or Yellow	BNC/SMA/SMC Shield	Pin 4	XLR Pin 1 and Pin 3	TRS Ring and Sleeve
Shielding	Shield	N/A	N/A	XLR Metal Shell	N/A

How to Order

Hydrophone	-Sensing Element	-HPF/LPF	-Mounting	-Cable Length	-Connector
BII-7031	Refer to options.	-3dB First Order Band Pass Filter Frequencies, in Hz/kHz.	Refer to Options.	in meter.	Refer to Options.

Example of Part Number:	Description
BII-7031-BII-7121-20Hz/100kHz-FH-20m-BNC&BS	BII-7031 Hydrophone with Sensing element BII-7121, Bandpass Filter: 20Hz to 100kHz, Free Hanging, 20m Shielded Cable, Connector: BNC Male for Signals, Battery Snap for +9VDC Batteries.

Pressure Noise Density (RTI, referred to the input): Noise Density varies with the built-in sensing element.