Benthowave Instrument Inc.

BII
SE=SL-TL+AG-NL

Underwater Sound Solutions   www.benthowave.com

BII7000 Series Omnidirectional Spherical Hydrophone

BII's spherical hydrophones provide omnidirectional responses up to 700kHz and offer excellent acoustic characteristics of low noise and durability, which make these hydrophones ideal for a wide range of oceanography applications. Bespoke built-in preamplifiers allow the hydrophones to be used with long extension cables with no loss in sensitivity. The customized built-in filters increase Signal-to-Noise Ratio, reject unwanted noises, and avoid saturation.

Typical Applications

Sonobuoy, Dipping Hydrophone.	Detection of Ultrasonic Cavitation Noise, Thermoacoustics in Gas.
LBL, SBL, USBL Positioning.	Passive Acoustic Monitoring (PAM System).
Parabolic Antennas Underwater.	Array Element, Vector Hydrophone Element.
Reference Hydrophone, Noise Measurement.	Marine Bioacoustics, Phantom-power Hydrophone, Sound Recording.

SPECIFICATION

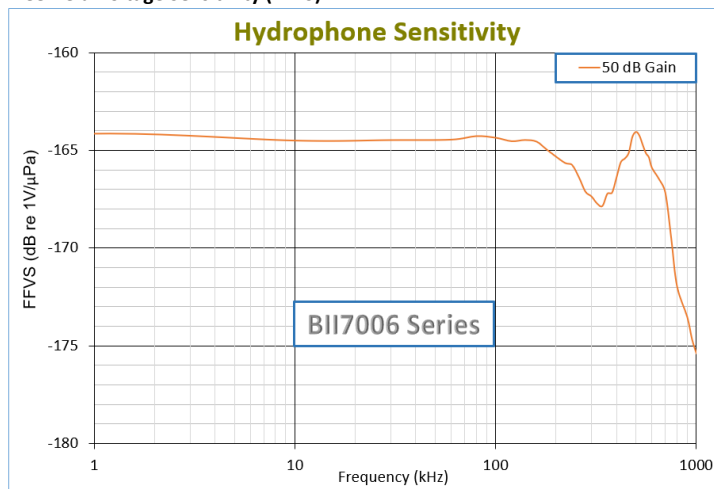| Part Number:	BII7006FG	BII7006PG
Sensitivity @ 1 kHz:	(-215 + Preamp Gain) dB V/µPa. Variation: ± 2dB	
FFVS:	Refer to Graph of **FFVS vs. Frequency**. Free-field Voltage Sensitivity.	
Usable Frequency:	**In Water**: 1 Hz ~ 700 kHz at ±3dB V/µPa	
	In Air: 1 Hz ~ 13.2 kHz at -3dB V/µPa	
Directivity Pattern:	Omnidirectional, Refer to Graph of **Beam Pattern.**	
Pressure Noise Density:	Refer to Graph of **Pressure Noise Density**, Referred to Input (RTI), in µPa/√Hz**.**	
Bespoke Preamp Gain (dB):	Fixed Gain Preamp: 1. Default 50 dB. 2. Customized: 20 to 60 dB available.	Programmable Gain Preamp: 20, 40, 60, 80 dB. -3dB Bandwidth: ≤ 60dB: 1MHz; 80dB: 350kHz.
Gain Selection Voltage: (Programmable Gain Preamp)	N/A	CMOS/TTL Compatible Logic Low 0: Gain Selection Wire to COM or 0 to +0.8VDC. Logic High 1: Gain Selection Wire Open or +2.4 to Vs.
Built-in Filters:	1. Default: -3dB High Pass filter: 2 Hz. 2. Bespoke High Pass or Band Pass filter.	
Output Type:	Differential	Differential
Maximum Output V$_{omax}$:	Maximum Output of the built-in preamplifier, in Vpp.	
Overload Pressure Level:	215 or [20*log(V$_{omax}$/2.828) – Sensitivity], whichever is less. in dB µPa.	
Acceleration Sensitivity:	130.0 dB µPa/(m/s²)	
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) 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 305 m.	
Connector:	1. Default: Wire Leads (WL) 2. 1/8" (3.5mm) TRS Plug (TRS35) (Max. Diameter Φ10.5 mm) 3. XLR (pin) (XLR) (Max. Diameter Φ20.2 mm) 4. MIL-5015 Style (pin) (5015) (Max. Diameter Φ30 mm with 3 contacts) 5. Underwater Mateable Connector (pin) (UMC) (Max. Diameter Φ21.5 to Φ35 mm) 6. +9VDC Battery Snap (BS) (Exclusive to preamplified hydrophone) Note: Underwater Mateable Connector is for uses underwater. Other connectors and wire leads are for dry uses and are not waterproofed.	
Supply Voltage Vs:	+7.5 to +32 VDC	+8.2 to +32 V
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):	17 mA	22 mA
Size:	ΦD = Φ21mm and Φ8.6 mm, Length ≥ 70 mm and actual length depends on Mounting Parts.	
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.	

Wiring of Fixed-gain Hydrophone

Wiring of Differential Output:	Wire Leads	Underwater Connector	XLR + 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 or Green	Pin 4	XLR Pin 3	TRS Ring

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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 Two-bit Programmable Gain Preamps:

Wiring of Differential Output:	Wire Leads	Underwater Connector	XLR Plug + 9V Battery Snap	TRS Plug + 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			Black	Black
Digital A1 (Gain Selection)	Yellow or Brown	Pin 5	Yellow or Brown	Yellow or Brown
Digital A0 (Gain 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

Selecting Sensitivity FFVS of Two-bit Digitally Programmable

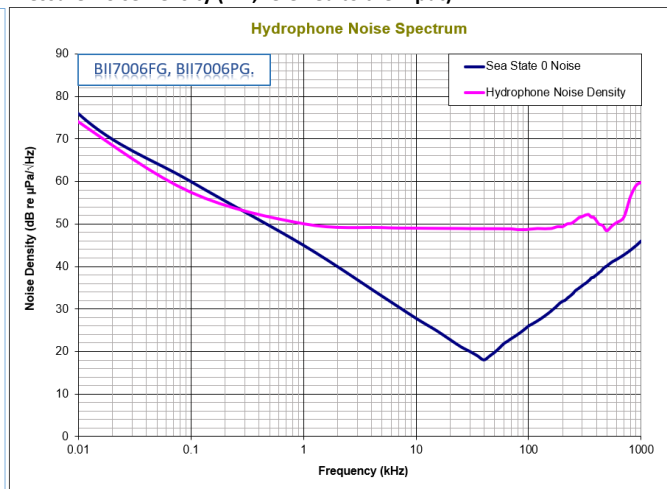| Gain Selection Wire A1	Gain Selection Wire A0	Hydrophone Sensitivity at 1 kHz
0 (Logic Low)	0 (Logic Low)	-215 + 20 dB V/μPa
0 (Logic Low)	1 (Logic High)	-215 + 40 dB V/μPa
1 (Logic High)	0 (Logic Low)	-215 + 60 dB V/μPa
1 (Logic High)	1 (Logic High)	-215 + 80 dB V/μPa

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

40.0 to 70.0   28.0   Acoustic Center: 4.0

Cable   Mounting Part and Preamp Housing Φ21   Spherical Sensing Element Φ8.6

Free-field Voltage Sensitivity (FFVS):
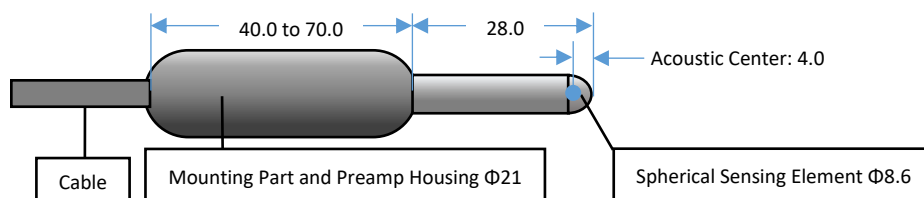
Hydrophone Sensitivity — 50 dB Gain — BII7006 Series

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

Hydrophone Noise Spectrum — BII7006FG, BII7006PG. — Sea State 0 Noise — Hydrophone Noise Density

Directivity Pattern:

Vertical Beam XZ Plane — 500kHz, 300kHz, 100kHz — BII7006 Series — 5dB/Division

Horizontal Beam XY Plane — 500kHz, 300kHz, 100kHz — BII7006 Series — 5dB/Division