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

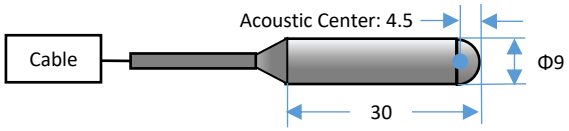
Sonobuoy, Dipping Hydrophone. LBL, SBL, USBL Positioning. Parabolic Antennas Underwater. Reference Hydrophone, Noise Measurement.	Detection of Ultrasonic Cavitation Noise, Thermoacoustics in Gas. Passive Acoustic Monitoring (PAM System). Array Element, Vector Hydrophone Element. Marine Bioacoustics,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

SPECIFICATION

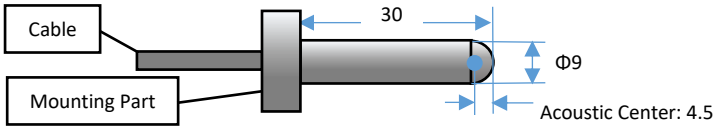
Part Number:	BII7003	BII7003HT
Sensitivity FFVS at 1 kHz:	-211.0 dB V/µPa + Sensitivity Loss over Cable. Variation: ± 2 dB.	
	Sensitivity Loss over Extension Cable (dB) = 20*log[C_h/(C_h+C_c)]. Valid for hydrophone without preamplifier. C_h: Hydrophone Capacitance; C_c: Capacitance of Extension Cable. Cable is of 100 pF/meter roughly.	
FFVS:	Refer to Graph of **FFVS vs. Frequency**. Free-field Voltage Sensitivity.	
Usable Frequency:	**In Water**: 1 Hz ~ 560 kHz at ±3dB V/µPa	
	In Air: 1 Hz ~ 12.6 kHz at -3dB V/µPa	
	Minimum Usable Frequency depends on -3dB high pass filter f_{-3dB} = 1/(2π$R_i$$C_h$). R_i: Input Resistance or Impedance of Preamp. C_h: Capacitance of hydrophone at 1 kHz.	
Capacitance C_h @ 1 kHz:	1.79 nF ± 10% without cable.	
Dissipation @ 1 kHz:	0.0044	
Noise Density at f << fs: dB µPa/√Hz	39.9 – 10*log f	
	1. f in kHz; fs: Resonance Frequency which is close to the frequency of maximum FFVS. 2. Noise densities in this datasheet are calculated values with transducer parameters being measured in water. 3. As hydrophones works with preamps or data acquisition modules, total noise density is determined by all noise sources. Generally, the total noise density is much higher than the ones stated in this datasheet.	
Directivity Pattern:	Omnidirectional, Refer to Graph of **Beam Pattern.**	
-3dB Beam Width:	Refer to Graph of **Beam Pattern.**	
Side Lobe Level:	No side lobes	
Signal Output Type:	Single Ended	
Acceleration Sensitivity:	130.8 dB µPa/(m/s²).	
Underwater Projector:	Yes. Do NOT use the hydrophone as a sound projector in the air otherwise the hydrophone will be damaged.	
Resonance fs:	330 kHz	
TVR at fs:	145 dB µPa/V at 1m.	
Maximum Drive Voltage:	300 Vpp	
Maximum Pulse Length:	100 mS at Maximum Drive Voltage	
Duty Cycle in Water:	10% at Maximum Drive Voltage. 100% ≤ 30 Vpp or 10.6 Vrms.	
Operating Depth:	400 m or 4 MPa, Maximum.	50 m or 0.5 MPa, Maximum.
	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) 3. Thru-hole Mounting with Single O-ring (THSO) 4. Thru-hole Mounting with Double O-ring (THDO) 5. Bolt Fastening Mounting (Plastics) (BFMP-M12x1.5) 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 Options:	1. Default: Coax RG174/U (RG174) 2. Coax RG58/U (RG58) 3. Shielded Cable with Rubber Jacket, ΦD=6.5 mm (SC65).	1. Default: Coax RG178/U (RG178). 2. Shielded Cable with Twisted Pair, PTFE Jacket. ΦD=3.2 mm (SC32). Not water-proof.
Cable Length:	Default: 6 m.	Default: 2 m.
	Custom-fit Cable Length.	
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. Max. Diameter Φ6.4 mm. 5. Underwater Mateable Connector (pin) (UMC). Max. Diameter Φ21.5 to Φ35 mm. (ONLY for -10°C to +60°C or 14°F to 140°F.)	
	Underwater Mateable Connector is for uses underwater. Other connectors and wire leads are for dry uses and are not waterproofed.	
Size:	ΦD = Φ9 mm, Length ≥ 30 mm and actual length depends on Mounting Parts.	
Weight:	≥ 0.09 kg with 6m cable. Actual weight depends on Mounting Parts, Cable Types and Length.	

Operation Temperature:	-10°C to +60°C or 14°F to 140°F.		-10°C to 120°C, or 14°F to 248°F.	
Storage Temperature:	-20 °C to +60 °C or -4 °F to 140 °F.			
Wiring:	**Wire Leads**	**Underwater Connector**	**BNC/SMA/SMC**	**Coax with Wire Leads**
Signal	White or Red	Pin 2	Center Contact	Coax Center Contact
Signal Common	Black	Pin 1	Shield	Coax Shield
Shielding	Shield	Pin 3	Shield	Coax Shield
Underwater Projector Application: for 50Ω BNC/SMA/SMC connector, it is buyer's sole responsibility to make sure that the BNC/SMA/SMC shield of the signal source is firmly grounded for operating safety before hooking up transducer/hydrophone to the signal source. Coax with BNC/SMA/SMC is not intended for hand-held use at voltages above 30Vac/60Vdc.				
Do NOT use the hydrophone as a sound projector in the air otherwise the hydrophone will be damaged.				
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.				

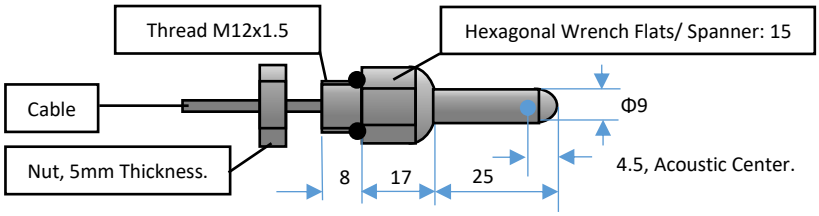
Physical Size (Dimensional Unit: mm) of Free Hanging:



Physical Size (Dimensional Unit: mm) with Mounting Part:

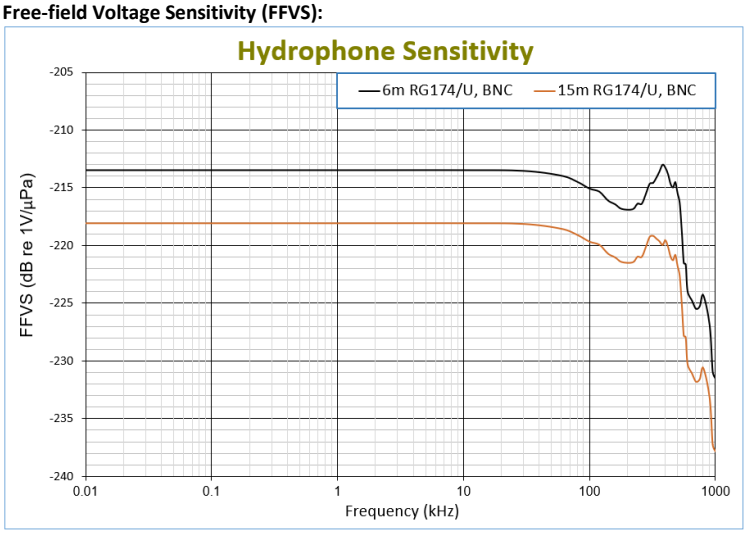


Bolt-fastening Mounting (Plastics) BFMP (300m Depth or 3MPa Ratings) or Thread Mounting into a submersible enclosure (IP68, tighten with o-ring).

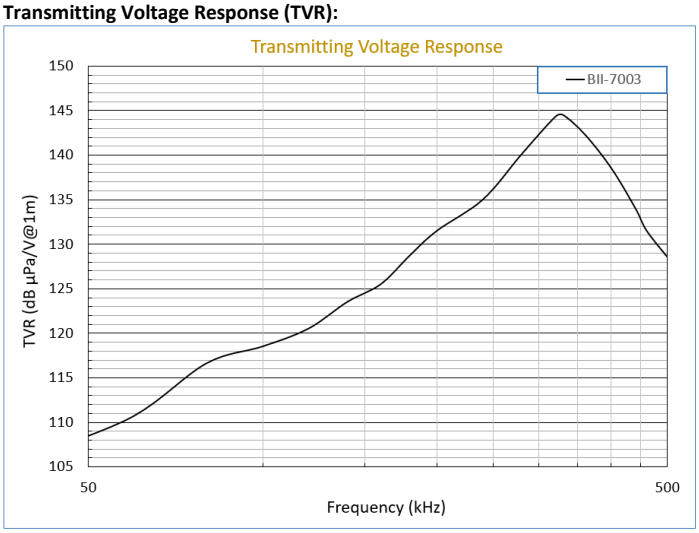


Bolt-Fastening Mount (Plastics) (**BFMP-M12x1.5**)
Thread: M12x1.5, Lock nut: included.
Maximum Depth: 300 m.
Mounting Hole: Φ12.1 to Φ13.0 mm.
Fastening Torque: ≤ 1.5 Nm.
Mounting Wall Thickness: ≤ 3 mm.

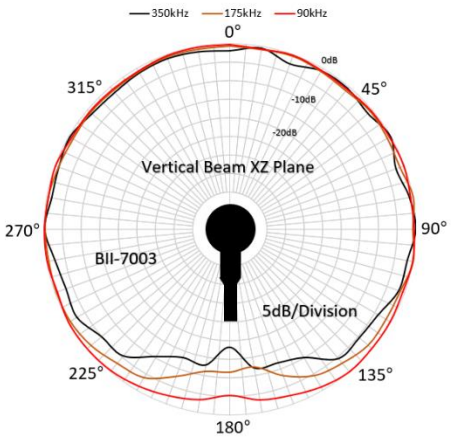
Free-field Voltage Sensitivity (FFVS):

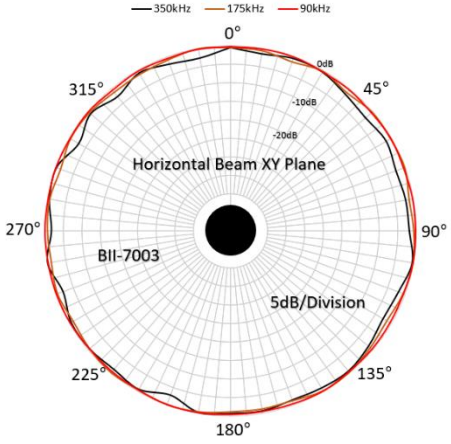


Transmitting Voltage Response (TVR):



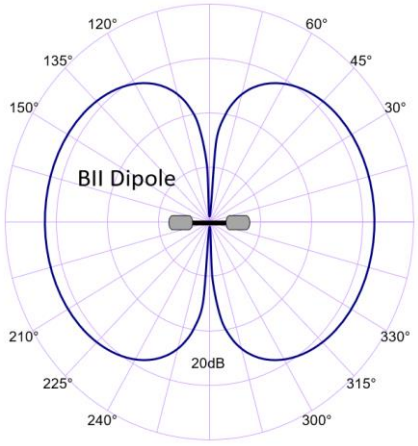
Directivity Pattern

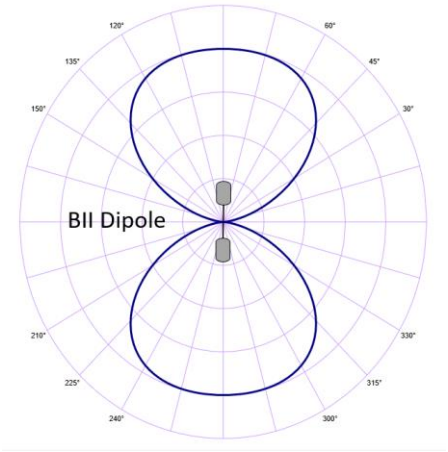




Simple Array Consisting of 2 or 3 Hydrophones.

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





Cardioid Pattern= Presure Hydrophone + Dipole.