Benthowave Instrument Inc.

Underwater Sound Solutions www.benthowave.com

High Temperature Hydrophones and Transducers: up to 200°C (392°F).

BII high temperature hydrophones and Transducers are developed for uses in high temperature materials (gases, liquids, and solids.) up to 200°C (392°F). The differential output and high capacitance of the hydrophone can be customized to drive long cable and reduce the pickup of EMI noise. Solvents should not be used with hydrophones, such as hydrochloric acid, isopropyl alcohol, ethyl lactate, acetone, xylene, Iso hexanes, mineral spirits, etc... The hydrophone should not be used with flammables, explosives and corrosives.

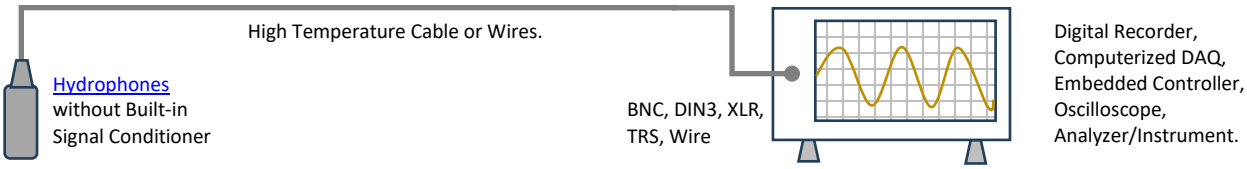
Typical Applications

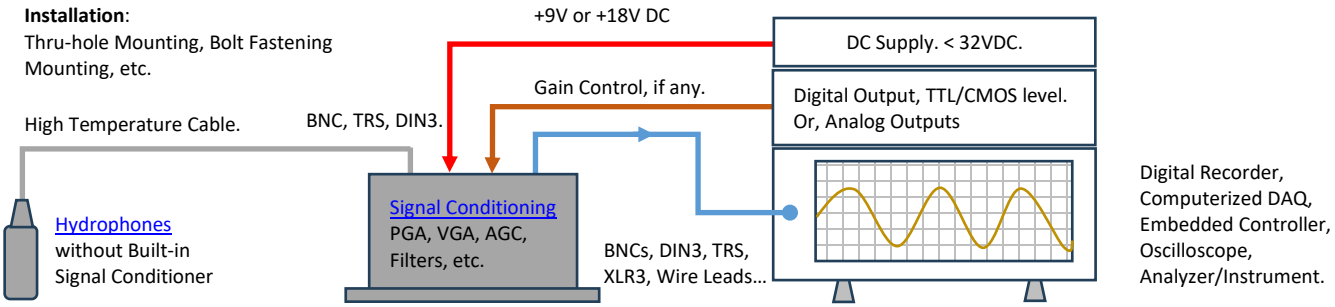
Sonic Processing, Testing, and Analysis in Laboratory. Underwater Sounds near Volcano, Industry Waste Liquid Monitoring. Food Industry (Special Order).	Acoustics in Chemical/Manufacturing Processes. Acoustic Investigation/Diagnostics of Machines, Material Study. Sound Testing in Pipes, Tanks or Vessels.

SYSTEM CONFIGURATION

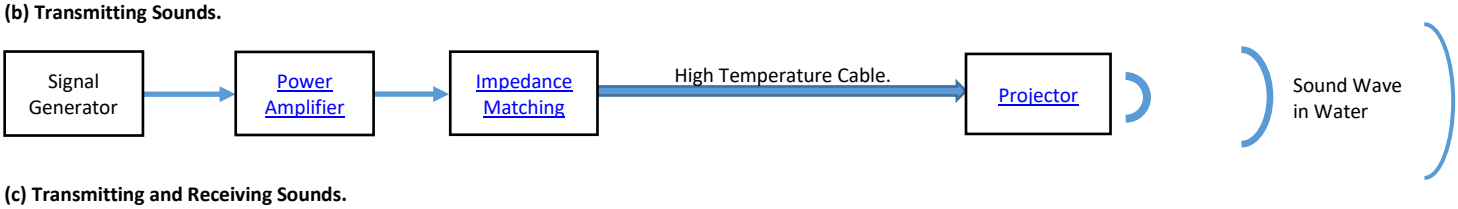
BII's electronics are NOT designed to withstand high temperature, these devices (Signal Generators, Preamps, Power Amplifiers, T/R Switches, Impedance Matching...) must operates in their rated temperature range. Refer to their respective datasheets for service temperatures.

(a) Receiving Sounds and Waves.

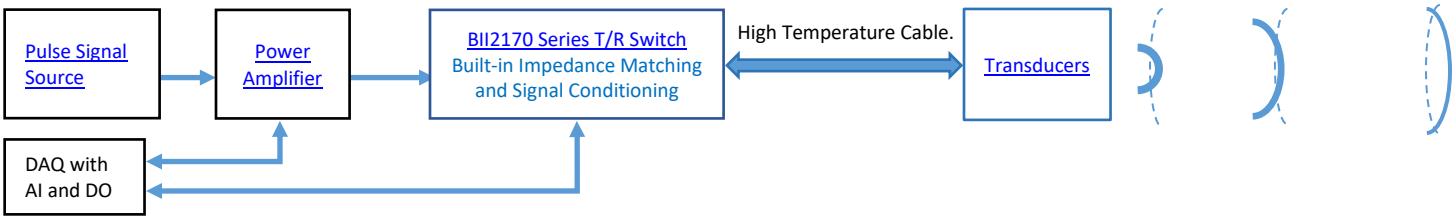




(b) Transmitting Sounds.



(c) Transmitting and Receiving Sounds.



RELATED PRODUCTS

Power Amplifier for SONAR, NDT, and HIFU	Impedance Matching between Transducers and Amplifiers	Transmit and Receive Switch with Preamp and Filter

Specification of High Temperature Hydrophone

BII's High Temperature Hydrophones and Transducers are customized from BII's standard hydrophones and transducers, and extend their service temperatures to 120°C or 200°C . Please refer to respective standard hydrophones for the information on frequency range, sensitivity, directivity response, installation, sizes, etc.			
High Temperature Hydrophone	BII7003 Spherical Hydrophone BII7010 Cylindrical Hydrophone	BII7070 Planar Hydrophone BII7230 AE Sensor	BII7070 Planar Hydrophone with 316/316L SS Housing
Directivity Pattern:	Omnidirectional	Conical	Conical
Service Temperature:	-15 to +120°C or 5 to 248°F	-15 to +120°C or 5 to 248°F	-15 to 200°C or 5 to 392°F
Housing:	Plastic or Rubber	Plastic or Rubber	316/316L Stainless Steel
Working Mode:	Immersion or Contact	Immersion or Contact	Contact ONLY
Signal Output Type:	1. Differential Output (DF). 2. Single ended (SE).	1. Differential Output (DF). 2. Single ended (SE).	1. Differential Output (DF). 2. Single ended (SE).
	Differential signal has better capability to reduce and reject EMI noise, especially over long cable.		
Underwater Projector:	hydrophone with Single-ended type can be used as low power projector.		
Built-in Preamp:	None. Please order standalone preamp if needed.		
Maximum Water Depth:	50 m (Equivalently 0.49 MPa), and Limited by the cable length if the cable has wire leads or a non-waterproof connector.		
Mounting:	1. Free Hanging (default) (**FH**). 2. Thru-hole Mounting with Single O-ring (**THM-M10, THM-7/16", or THM-5/8"**.) 3. Thru-hole Mounting with Double O-ring (**THDO-7/16"**). 3. Bolt Fastening Mounting (Stainless Steel) (**BFM-M6, BFM-7/16", or BFM-5/8"**.)		
	Please refer to online document AcousticSystem.pdf for a complete list of Mounting Options and more details.		
Cable:	1. **HTWL**: High Temperature Twisted Wire Bundle (Max. 200°C or 392°F). 2. **HTSC200**: High Temperature Twisted-Pair Shielded Cable (Max. 200°C or 392°F). The cable is NOT waterproofed. 3. **RG178**: Coax RG178B/U (Max. 200°C or 392°F). Only for Single-ended Output. 4. **HTSC150**: High Temperature Shielded Cable (Max. 150°C or 302°F).		
	Differential/balanced signals over shielded twisted pair cable is recommended to reject Electromagnetic Interference (EMI).		
Cable Length:	1. 6m (default). 2. Custom: up to 30m. Note: longer cable is available, please contact BII for details.		
Connector:	1. Wire Leads (**WL**). 2. DIN Receptacle with 3 Male Pins (**DIN3**), (Max. Diameter Φ17 mm). for SE or DF. -40°C to +100°C or -40°F to 212°F. 3. Male BNC (**BNC**), Max. Diameter Φ14.3 mm, for SE ONLY. BNC Plug service temperature -65°C ~ 165°C, or -85°F ~ 329°F. 4. XLR Receptacle with 3 Male Pins (**XLR3**), Max. Diameter Φ20.2 mm, for SE or DF. -25°C to +75°C or -13°F to +167°F. 5. 1/8" (3.5mm) TRS Plug (**TRS**), Max. Diameter Φ10.5 mm, for SE or DF. -25°C to +75°C or -13°F to +167°F.		
	The connectors/wire leads are for dry uses and are not waterproofed.		
Storage Temperature:	-20°C to +60°C or -4°F to 140°F.		
Signal Conditioning:	Signal Conditioning PGA, VGA, AGC, Filters, etc.		
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.			

Hydrophone Wirings

Differential Output:	**Wire Leads**	**DIN3**	**TRS Plug**	**XLR3**
Signal +	White or Red	Pin 3	Tip, Positive/Hot	Pin 2, Positive/Hot.
Signal -	Black	Pin 1	Ring, Negative/Cold	Pin 3, Negative/Cold.
Common & Shielding	Shield	Pin 2	Sleeve, Ground/Common	Pin 1, Shield/Ground.
Single Ended Output:	**Wire Leads**	**DIN3**	**BNC/SMA/SMC**	**Coax with Wire Leads**
Signal	White or Red	Pin 3	Center Contact	Coax Center Contact
Signal Common	Black	Pin 1	Shield	Coax Shield
Shielding	Shield	Pin 2	Shield	Coax Shield

Specification of High Temperature Transducer

BII's High Temperature Hydrophones and Transducers are customized from BII's standard hydrophones and transducers, and extend their service temperatures to 120°C or 200°C . Please refer to respective standard hydrophones for the information on frequency range, sensitivity, directivity response, installation, sizes, etc.			
High Temperature Transducers:	BII-7520 Spherical BII-7510 Communication	BII-7700 Hemispherical BII-7730 Broadband	BII-7730 Broadband
Directivity Pattern:	Omnidirectional, Toroidal.	Hemispherical, Conical.	Conical.
Service Temperature:	-15 to +120°C or 5 to 248°F	-15 to +120°C or 5 to 248°F	-15 to 200°C or 5 to 392°F
Housing:	Plastic or Rubber	Plastic or Rubber	316/316L Stainless Steel
Working Mode:	Immersion or Contact	Immersion or Contact	Contact ONLY
Signal Type:	Single ended (SE).	Single ended (SE).	Single ended (SE).
Pulse Driving Signal:	Spike (Negative or Positive), pulse and burst SINE/Square/Chirp excitation.		
Quality Factor Qm:	3 to 5 Typical		
impedance Matching:	No built-in impedance Matching, Please order standalone impedance Matching devices if needed.		
Maximum Water Depth:	50 m (Equivalently 0.49 MPa), and Limited by the cable length if the cable has wire leads or a non-waterproof connector.		
Mounting:	1. Free Hanging (default) (**FH**). 2. Thru-hole Mounting with Single O-ring (**THM-M10, THM-7/16", or THM-5/8"**.) 3. Thru-hole Mounting with Double O-ring (**THDO-7/16"**). 4. Bolt Fastening Mounting (Stainless Steel) (**BFM-M6, BFM-7/16", or BFM-5/8"**.) 5. Bolt-Fastening Mounting with Free Hanging (**BFM-FH-M6, BFM-FH-M8, BFM-FH-M10, BFM-FH-3/8".)**		
	Please refer to online document AcousticSystem.pdf for a complete list of Mounting Options and more details.		
Cable:	1. HTWL: High Temperature Twisted Wire Bundle (Max. 200°C or 392°F). 2. HTSC200: High Temperature Twisted-Pair Shielded Cable (Max. 200°C or 392°F). The cable is NOT waterproofed. 3. RG178: Coax RG178B/U (Max. 200°C or 392°F). Only for Single-ended Output. 4. HTSC150: High Temperature Shielded Cable (Max. 150°C or 302°F).		
Cable Length:	1. 6m (default). 2. Custom: up to 30m. Note: longer cable is available, please contact BII for details.		
Connector:	1. Wire Leads (**WL**). 2. DIN Receptacle with 3 Male Pins (**DIN3**), (Max. Diameter Φ17 mm). for SE or DF. -40°C to +100°C or -40°F to 212°F. 3. Male BNC (**BNC**), Max. Diameter Φ14.3 mm, for SE ONLY. BNC Plug service temperature -65°C ~ 165°C, or -85°F ~ 329°F. 4. XLR Receptacle with 3 Male Pins (**XLR3**), Max. Diameter Φ20.2 mm, for SE or DF. -25°C to +75°C or -13°F to +167°F. 5. MIL-5015 Style (3 pin) (**MIL3P**) (Max. Diameter Φ19 to Φ30 mm). Up to +125°C or 257°F.		
	The connectors/wire leads are for dry uses and are not waterproofed.		
Storage Temperature:	-20°C to +60°C or -4°F to 140°F.		
Temperature Sensor:	1. Default: No built-in temperature sensor. 2. Built-in temperature sensor. Append **-TS** to part number (BIIxxxx-TS) for integrating a temperature sensor in the transducer.		
Power Amplifier:	BII5000 Power Amplifiers for SONAR, NDT, HIFU. Order Separately as standalone devices.		
Impedance Matching:	BII6000 Bespoke Standalone Impedance Matching between transducers and power amplifiers. Order Separately. BII6000 Series Service Temperature: -20°C to +75°C, or -4°C to +167°F.		
TR Switch Module:	BII2100 Transmitting & Receiving Switch Module with Built-in Preamp and Bandpass Filter. Order Separately as standalone devices or append **-TR** to the part number for integrating BII2100 into the transducer. For example, BIIxxxx-TR: BIIxxxx transducer with built-in T/R Switch Module.		
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.			

Wiring Information of a Transducer.

Transducer Wiring:	**Shielded Cable**	**Coax, BNC.**	**MIL3P**	**DIN3P**	**XLR3P**
Signal:	White or Red	Center Contact	Contact C or G	Pin 3	Pin 2
Signal Common:	Black	Shield	Contact B	Pin 1	Pin 3
Shielding and Grounding	Shield	Shield	Contact A	Pin 2	Pin 1

Wiring Information of Temperature Signal.

Temperature Sensor Wiring:	**Shielded Cable**	**Coax, BNC**	**DIN3S**
Signal:	White or Red	Center Contact	Socket 3
Signal Common:	Black	Shield	Socket 1
Shielding and Grounding	Shield	Shield	Socket 2

Cable and Connector Information for Signals of Hydrophones and Transducers.

	Wire and Cable Types	**Ratings of Voltage, Current or Power, and Temperature.**
Cables:	Twisted High Temperature Wire Bundles.	300 Vrms, 6.5 Arms, up to +200°C or 392°F.
	High Temperature Shielded Cable (**HTSC200**).	600 Vrms, 6 Arms, up to +200°C or 390 °F, Non-waterproof.
	Coax RG178B/U (50Ω) (**RG178**).	750 Vrms, 0.86 Arms, -70°C To +200°C or -94°F to 392°F.
Connectors:	**Connector Type**	**Ratings of Voltage, Current or Power, and Temperature.**
	1. Wire Leads (**WL**)	Used for Cables or Wires.
	2. 50Ω BNC (**BNC**), Bayonet Lock. Panel Mount or In-line. In-line BNC: Input uses Pin, output uses Socket. Panel Mount BNC: Both Input and Output use BNC Jacks.	500Vrms, 316W. (1) -65°C ~ 165°C, or -85°F ~ 329°F. (2) -40°C ~ 85°C, or -40°F ~ 185°F. Used for Grounded Signal with Metal Enclosures or Coax Cables.
	3. MIL-5015 Type Connector (**MIL**), Thread Fastening. Panel Mount or In-line. Input uses Pin, output uses Socket.	500Vrms, 13 A; Up to +125°C or 257°F, or, 900Vrms, 13 A; Up to +125°C or 257°F. Used for Metal Enclosures or Shielded Cables.
	4. Circular Connector DIN EN (**DIN**), Thread Fastening. Panel Mount or In-line. Input uses Pin, Output uses Socket.	250Vrms, 10 A; -40°C to +100°C or -40°F to 212°F. Used for Metal Enclosures or Shielded Cables.
	5. XLR Connector (**XLR**), Positive Latchlock. Panel Mount or In-line. Input uses Pin, Output uses Socket.	133Vrms, 15 A; -25°C to +75°C or -13°F to +167°F. Used for Metal Enclosures or Shielded Cables.
	6. 3.5mm or 1/8" TRS (**TRS35**), Panel Mount with Jack, In-line with Plug, for analog audio signals.	30Vrms, 0.3A; -25°C to +75°C or -13°F to +167°F. Used for Metal Enclosures or Shielded Cables.
	7. Underwater Mateable Connector (**UMC**), Thread Fastening. Panel Mount or In-line. Input uses Pin, Output uses Socket.	600Vrms, 10A. Waterproof, IP68. 3000m Ocean Depth. -40°C ~ 60°C, or -40°F ~ 140°F. Used for Metal Enclosures or Shielded Cables.