

# Benthowave Instrument Inc.

Underwater Sound Solutions

www.benthowave.com

### Transducer Specification

Part Number:	BII-7511Q BII-7511QHT				
Signal Type:	Pulsed SINE, Chirp, PSK, FSK, etc.; Pulsed Square Waveform.				
40 kHz					
Resonant Frequency fs:	1. Efficiency is low in the frequency 2. Transducer can operate in low p	Efficiency is low in the frequency range far from $f_s$ , so it is NOT recommended to operate transducer at frequency far from $f_s$ . Transducer can operate in low power at frequency far from fs, the input power P <sub>i</sub> should be much less than 1% MCIP at $f_s$ .			
Quality Factor Qm:	1.5, Note: -3dB bandwidth $\Delta f = fs/Q_m$ .				
TVR:	136.5 dB μPa/V at 1m at fs, Refer to TVR Graph, Transmitting Voltage Response.				
FFVS:	-200.0 dB V/μPa at fs, Free-field Voltage Sensitivity.				
-3dB Beam Width:	Horizontal x Vertical = Omni x 80° at fs.				
Directivity Pattern:	Toroidal Beam at fs: Omnidirectional at f ≤ 14 kHz.				
Eree Capacitance:	32 nF @ 1kHz				
Dissipation:	0.005 @ 1kHz				
Admittance or Impedance:	$G_{max}$ = 0.681 mS, B = 2.683 mS at fs, with 20 m shielded cable.				
MIPP at fs:	250 Watts, Maximum Input Pulse Power.				
MPW @ MIPP at fs:	25 Seconds. Maximum Pulse Width.				
MCIP at fs:	60 Watts, Maximum Continuous Input Power.				
How to determine nulse width duty cycle and off-time with input nulse power (peak power):					
1. Determine the input pulse 2. Pulse Width $\leq$ (MIPP * MP 3. Duty Cycle D $\leq$ MCIP*(120 4. Off-time $\geq$ PW*(1-D)/D.	power (IPP, peak power) with sound W*(120°c-T)/103°c)/IPP. T: Water Ter °c-T)/103°c)/IPP.	intensity required by the projection porter in °c.	ct. IPP MUST be less than MIPP.		
Operating Depth:	300 m, Maximum.		50 m, Maximum.		
Operating Depth:	Limited by the cable length if the cable has wire leads or a non-waterproof connector.				
Mounting Options:	<ol> <li>Derault: Free Hanging (FH)</li> <li>Thru-hole Mounting with Single O-ring (THSO)</li> <li>Thru-hole Mounting with Double O-ring (THDO)</li> <li>Bolt Fastening Mounting (Stainless Steel) (BFMSS)</li> <li>End-face Mounting (EFM)</li> <li>Flange Mounting (FGM)</li> <li>Please refer to online document AcousticSystem.pdf for a complete list of Mounting Options and more details.</li> </ol>				
Cable:	1. Two Conductor Shielded Cable (SC). 2. 50 Ω RG58 Coax (RG58).				
Cable Length:	1. Default: 1 m. 2. Customized Length.				
Connector:	<ol> <li>Default: Wire Leads (WL)</li> <li>50 Ω BNC Male (BNC)</li> <li>Underwater Mateable Connector (UMC)</li> <li>MIL-5015 Style (5015)</li> <li>Custom (Custom)</li> <li>Note: Underwater Mateable Connector is for underwater uses. Other connectors and wire leads are for dry uses and are non-waterproof.</li> </ol>				
Size ΦDxH:	Φ38x56 mm, and actual length dep	Φ38x56 mm, and actual length depends on Mounting Parts.			
	1.5 kg with 10 m cable. Actual weight depends on Mounting Parts, Cable Types and Length.				
Weight:	1.5 kg with 10 m cable. Actual weig	ends on Mounting Parts. ht depends on Mounting Parts,	Cable Types and Length.		
Weight: Operation Temperature:	1.5 kg with 10 m cable. Actual weig -10°C to 60°C, or 14°F to 140°F.	ends on Mounting Parts. ht depends on Mounting Parts,	Cable Types and Length. -10°C to 120°C, or 14°F to 248°	F	
Weight: Operation Temperature: Storage Temperature:	1.5 kg with 10 m cable. Actual weig -10°C to 60°C, or 14°F to 140°F. -20°C to +60°C, or -4°F to 140°F.	ends on Mounting Parts. ht depends on Mounting Parts,	Cable Types and Length. -10°C to 120°C, or 14°F to 248°	F	
Weight: Operation Temperature: Storage Temperature: Impedance Matching:	<ul> <li>1.5 kg with 10 m cable. Actual weig</li> <li>-10°C to 60°C, or 14°F to 140°F.</li> <li>-20°C to +60°C, or -4°F to 140°F.</li> <li>BII-6000 Bespoke Impedance Match for integrating BII-6000 in the trans Impedance Matching unit as a 50 Ω</li> </ul>	ends on Mounting Parts. ht depends on Mounting Parts, ning between transducers and p ducer, and specify impedance i load.	Cable Types and Length. -10°C to 120°C, or 14°F to 248° ower amplifiers. Order Separately. n Ω. For example, BII-xxxxIM50Ω: I	F Append IM to the part number BII-xxxx transducer with built-in	
Weight: Operation Temperature: Storage Temperature: Impedance Matching: TR Switch:	1.5 kg with 10 m cable. Actual weig         -10°C to 60°C, or 14°F to 140°F.         -20°C to +60°C, or -4°F to 140°F.         BII-6000 Bespoke Impedance Match for integrating BII-6000 in the trans Impedance Matching unit as a 50 Ω         BII-2100 Transmitting & Receiving S	ends on Mounting Parts. ht depends on Mounting Parts, ning between transducers and p ducer, and specify impedance i load. witch. Not Included. Order Sep	Cable Types and Length. -10°C to 120°C, or 14°F to 248° ower amplifiers. Order Separately. n Ω. For example, BII-xxxxIM50Ω: I arately, Append TR to part numbe	F Append IM to the part number BII-xxxx transducer with built-in r (BII-xxxxTR).	
Weight: Operation Temperature: Storage Temperature: Impedance Matching: TR Switch: Temperature Sensor:	<ol> <li>1.5 kg with 10 m cable. Actual weig</li> <li>-10°C to 60°C, or 14°F to 140°F.</li> <li>-20°C to +60°C, or -4°F to 140°F.</li> <li>BII-6000 Bespoke Impedance Match for integrating BII-6000 in the trans Impedance Matching unit as a 50 Ω</li> <li>BII-2100 Transmitting &amp; Receiving S</li> <li>Default: No built-in temperature</li> <li>Built-in temperature sensor. App</li> </ol>	ends on Mounting Parts. ht depends on Mounting Parts, ning between transducers and p ducer, and specify impedance i load. witch. Not Included. Order Sep sensor. end <b>TS</b> to part number (BII-xxx)	Cable Types and Length. -10°C to 120°C, or 14°F to 248° ower amplifiers. Order Separately. n Ω. For example, BII-xxxxIM50Ω: I arately, Append TR to part number (TS) for integrating a temperature	F Append IM to the part number BII-xxxx transducer with built-in r (BII-xxxxTR). sensor in the transducer.	
Weight: Operation Temperature: Storage Temperature: Impedance Matching: TR Switch: Temperature Sensor: Potable Transmitter:	<ol> <li>1.5 kg with 10 m cable. Actual weig</li> <li>-10°C to 60°C, or 14°F to 140°F.</li> <li>-20°C to +60°C, or -4°F to 140°F.</li> <li><u>BII-6000</u> Bespoke Impedance Match for integrating BII-6000 in the trans Impedance Matching unit as a 50 Ω</li> <li><u>BII-2100</u> Transmitting &amp; Receiving S</li> <li>1. Default: No built-in temperature</li> <li><u>Built-in temperature sensor</u>. App <u>BII-8030</u> series portable acoustic trans</li> </ol>	ends on Mounting Parts. ht depends on Mounting Parts, hing between transducers and p ducer, and specify impedance i load. witch. Not Included. Order Sep sensor. end TS to part number (BII-xxx) ansmitters.	Cable Types and Length. -10°C to 120°C, or 14°F to 248° ower amplifiers. Order Separately. n Ω. For example, BII-xxxxIM50Ω: I arately, Append TR to part number (TS) for integrating a temperature s	F Append IM to the part number BII-xxxx transducer with built-in r (BII-xxxxTR). sensor in the transducer.	
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Weight:         Operation Temperature:         Storage Temperature:         Impedance Matching:         TR Switch:         Temperature Sensor:         Potable Transmitter:         Portable T/R System:         WARNING: DANGER — HIGH         shield must be grounded firm	<ol> <li>1.5 kg with 10 m cable. Actual weig</li> <li>-10°C to 60°C, or 14°F to 140°F.</li> <li>-20°C to +60°C, or -4°F to 140°F.</li> <li>BII-6000 Bespoke Impedance Match for integrating BII-6000 in the trans Impedance Matching unit as a 50 Ω</li> <li>BII-2100 Transmitting &amp; Receiving S</li> <li>Default: No built-in temperature</li> <li>Built-in temperature sensor. App</li> <li>BII-8030 series portable acoustic transmitting</li> <li>VOLTAGE on wires. Wires shall be inseling to the sensor.</li> </ol>	ends on Mounting Parts. ht depends on Mounting Parts, ing between transducers and p ducer, and specify impedance i load. witch. Not Included. Order Sep sensor. end <b>TS</b> to part number (BII-xxxx ansmitters. id receive systems. ulated for safety. DO NOT TOUC	Cable Types and Length. -10°C to 120°C, or 14°F to 248° ower amplifiers. Order Separately. n Ω. For example, BII-xxxxIM50Ω: I arately, Append TR to part number (TS) for integrating a temperature of the temperature of te	F Append IM to the part number BII-xxxx transducer with built-in r (BII-xxxxTR). sensor in the transducer. G SIGNAL IS SHUT DOWN. Cable	
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Weight:         Operation Temperature:         Storage Temperature:         Impedance Matching:         TR Switch:         Temperature Sensor:         Potable Transmitter:         Portable T/R System:         WARNING: DANGER — HIGH         shield must be grounded firm         for 50Ω BNC Male connector         before hooking up transduce         Wiring:	<ol> <li>1.5 kg with 10 m cable. Actual weig</li> <li>-10°C to 60°C, or 14°F to 140°F.</li> <li>-20°C to +60°C, or -4°F to 140°F.</li> <li>BII-6000 Bespoke Impedance Match for integrating BII-6000 in the trans Impedance Matching unit as a 50 Ω</li> <li>BII-2100 Transmitting &amp; Receiving S</li> <li>Default: No built-in temperature 2. Built-in temperature sensor. App</li> <li>BII-8030 series portable acoustic transmitting BII-8080 series portable transmit ar</li> <li>VOLTAGE on wires. Wires shall be insolved for safety.</li> <li>r, it is buyer's sole responsibility to match actual series of the signal source. Construction of the signal source of the signal sou</li></ol>	ends on Mounting Parts. ht depends on Mounting Parts, hing between transducers and p ducer, and specify impedance i load. witch. Not Included. Order Sep sensor. end <b>TS</b> to part number (BII-xxxx ansmitters. and receive systems. ulated for safety. DO NOT TOUC ake sure that the (female) BNC pax with BNC is not intended for <b>Coax/BNC</b>	Cable Types and Length. -10°C to 120°C, or 14°F to 248° ower amplifiers. Order Separately. n Ω. For example, BII-xxxxIM50Ω: I arately, Append TR to part number (TS) for integrating a temperature second CH THE WIRES BEFORE THE DRIVING shield of the signal source is firmly r hand-held use at voltages above Underwater Connector	F Append IM to the part number BII-xxxx transducer with built-in r (BII-xxxxTR). sensor in the transducer. G SIGNAL IS SHUT DOWN. Cable r grounded for operating safety 30Vac/60Vdc. MIL-5015 Connector	
Weight:         Operation Temperature:         Storage Temperature:         Impedance Matching:         TR Switch:         Temperature Sensor:         Potable Transmitter:         Portable T/R System:         WARNING: DANGER — HIGH         shield must be grounded firr         for 50Ω BNC Male connector         before hooking up transduce         Wiring:         Signal:	<ol> <li>1.5 kg with 10 m cable. Actual weig         <ul> <li>-10°C to 60°C, or 14°F to 140°F.</li> <li>-20°C to +60°C, or -4°F to 140°F.</li> </ul> </li> <li>BII-6000 Bespoke Impedance Match for integrating BII-6000 in the trans Impedance Matching unit as a 50 Ω         <ul> <li>BII-2100 Transmitting &amp; Receiving S</li> <li>Default: No built-in temperature</li> <li>Built-in temperature sensor. App         </li> <li>BII-8030 series portable acoustic transmit ar         </li> <li>VOLTAGE on wires. Wires shall be insel for safety.</li> <li>r, it is buyer's sole responsibility to matry for safety.</li> <li>Mitelded Cable/Wire Leads</li> </ul> </li> </ol>	ends on Mounting Parts. ht depends on Mounting Parts, hing between transducers and p ducer, and specify impedance i load. witch. Not Included. Order Sep sensor. end TS to part number (BII-xxxx ansmitters. and receive systems. ulated for safety. DO NOT TOUC ake sure that the (female) BNC bax with BNC is not intended for Coax/BNC Center Contact	Cable Types and Length. -10°C to 120°C, or 14°F to 248° ower amplifiers. Order Separately. n Ω. For example, BII-xxxxIM50Ω: I arately, Append TR to part number (TS) for integrating a temperature s CH THE WIRES BEFORE THE DRIVING shield of the signal source is firmly r hand-held use at voltages above Underwater Connector Contact 2	F Append IM to the part number BII-xxxx transducer with built-in r (BII-xxxxTR). sensor in the transducer. G SIGNAL IS SHUT DOWN. Cable r grounded for operating safety 30Vac/60Vdc. MIL-5015 Connector Contact C	
Weight:         Operation Temperature:         Storage Temperature:         Impedance Matching:         TR Switch:         Temperature Sensor:         Potable Transmitter:         Portable T/R System:         WARNING: DANGER — HIGH         shield must be grounded firr         for 50Ω BNC Male connector         before hooking up transduce         Wiring:         Signal:         Signal Common:	<ol> <li>1.5 kg with 10 m cable. Actual weig</li> <li>-10°C to 60°C, or 14°F to 140°F.</li> <li>-20°C to +60°C, or -4°F to 140°F.</li> <li>BII-6000 Bespoke Impedance Match for integrating BII-6000 in the trans Impedance Matching unit as a 50 Ω</li> <li>BII-2100 Transmitting &amp; Receiving S</li> <li>1. Default: No built-in temperature</li> <li>2. Built-in temperature sensor. App</li> <li>BII-8030 series portable acoustic transmit ar</li> <li>VOLTAGE on wires. Wires shall be insing for safety.</li> <li>r, it is buyer's sole responsibility to marryhydrophone to the signal source. Co</li> <li>Shielded Cable/Wire Leads</li> <li>White or Red</li> <li>Black</li> </ol>	ends on Mounting Parts. ht depends on Mounting Parts, ht depends on Mounting Parts, ling between transducers and p ducer, and specify impedance i load. witch. Not Included. Order Sep sensor. end <b>TS</b> to part number (BII-xxxx ansmitters. and receive systems. ulated for safety. DO NOT TOUC ake sure that the (female) BNC bax with BNC is not intended for <b>Coax/BNC</b> Center Contact Shield	Cable Types and Length. -10°C to 120°C, or 14°F to 248° ower amplifiers. Order Separately. n Ω. For example, BII-xxxxIM50Ω: I arately, Append TR to part number (TS) for integrating a temperature : CH THE WIRES BEFORE THE DRIVING shield of the signal source is firmly r hand-held use at voltages above Underwater Connector Contact 2 Contact 1	F Append IM to the part number BII-xxxx transducer with built-in r (BII-xxxxTR). sensor in the transducer. G SIGNAL IS SHUT DOWN. Cable r grounded for operating safety 30Vac/60Vdc. MIL-5015 Connector Contact C Contact B	
Weight:         Operation Temperature:         Storage Temperature:         Impedance Matching:         TR Switch:         Temperature Sensor:         Potable Transmitter:         Portable T/R System:         WARNING: DANGER — HIGH         shield must be grounded firr         for 50Ω BNC Male connector         before hooking up transduce         Wiring:         Signal:         Signal Common:         Shielding and Grounding:	<ol> <li>1.5 kg with 10 m cable. Actual weig</li> <li>-10°C to 60°C, or 14°F to 140°F.</li> <li>-20°C to +60°C, or -4°F to 140°F.</li> <li>BII-6000 Bespoke Impedance Match for integrating BII-6000 in the trans Impedance Matching unit as a 50 Ω</li> <li>BII-2100 Transmitting &amp; Receiving S</li> <li>1. Default: No built-in temperature</li> <li>2. Built-in temperature sensor. App</li> <li>BII-8030 series portable acoustic transmity for safety.</li> <li>r, it is buyer's sole responsibility to mater/hydrophone to the signal source. Construction</li> <li>Shielded Cable/Wire Leads</li> <li>White or Red</li> <li>Black</li> <li>Shield</li> </ol>	ends on Mounting Parts. ht depends on Mounting Parts, ht depends on Mounting Parts, ing between transducers and p ducer, and specify impedance i load. witch. Not Included. Order Sep sensor. end <b>TS</b> to part number (BII-xxx) ansmitters. ad receive systems. ulated for safety. DO NOT TOUC ake sure that the (female) BNC bax with BNC is not intended for <b>Coax/BNC</b> Center Contact Shield Shield	Cable Types and Length. -10°C to 120°C, or 14°F to 248° ower amplifiers. Order Separately. n Ω. For example, BII-xxxxIM50Ω: I arately, Append TR to part number (TS) for integrating a temperature : CH THE WIRES BEFORE THE DRIVING shield of the signal source is firmly r hand-held use at voltages above Underwater Connector Contact 2 Contact 1 Contact 3	F Append IM to the part number BII-xxxx transducer with built-in r (BII-xxxxTR). sensor in the transducer. G SIGNAL IS SHUT DOWN. Cable r grounded for operating safety 30Vac/60Vdc. MIL-5015 Connector Contact C Contact B Contact A	
Weight:         Operation Temperature:         Storage Temperature:         Impedance Matching:         TR Switch:         Temperature Sensor:         Potable Transmitter:         Portable T/R System:         WARNING: DANGER — HIGH         shield must be grounded firr         for 50Ω BNC Male connectoo         before hooking up transduce         Wiring:         Signal:         Signal Common:         Shielding and Grounding:         Note:	<ol> <li>1.5 kg with 10 m cable. Actual weig</li> <li>-10°C to 60°C, or 14°F to 140°F.</li> <li>-20°C to +60°C, or -4°F to 140°F.</li> <li>BII-6000 Bespoke Impedance Match for integrating BII-6000 in the trans Impedance Matching unit as a 50 Ω</li> <li>BII-2100 Transmitting &amp; Receiving S</li> <li>1. Default: No built-in temperature</li> <li>2. Built-in temperature sensor. App</li> <li>BII-8030 series portable acoustic transmitting a sole series portable transmit ar</li> <li>VOLTAGE on wires. Wires shall be insoly for safety.</li> <li>r, it is buyer's sole responsibility to mater/hydrophone to the signal source. Construction</li> <li>Shield</li> <li>Wire Leads: Dry Use.</li> </ol>	ends on Mounting Parts. ht depends on Mounting Parts, ht depends on Mounting Parts, ht depends on Mounting Parts, ht depends on Mounting Parts, ling between transducers and p ducer, and specify impedance i load. witch. Not Included. Order Sep sensor. end TS to part number (BII-xxxx) ansmitters. Ind receive systems. ulated for safety. DO NOT TOUC ake sure that the (female) BNC bax with BNC is not intended for Coax/BNC Center Contact Shield Dry Use	Cable Types and Length. -10°C to 120°C, or 14°F to 248° ower amplifiers. Order Separately. n Ω. For example, BII-xxxxIM50Ω: I arately, Append TR to part number (TS) for integrating a temperature : CH THE WIRES BEFORE THE DRIVING shield of the signal source is firmly r hand-held use at voltages above Underwater Connector Contact 2 Contact 1 Contact 3 Underwater Use	F Append IM to the part number BII-xxxx transducer with built-in r (BII-xxxxTR). sensor in the transducer. G SIGNAL IS SHUT DOWN. Cable (grounded for operating safety 30Vac/60Vdc. MIL-5015 Connector Contact C Contact B Contact A Dry Use	



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Physical Size (Dimensional Unit: mm): The overall length varies with the length of mounting parts. Please refer to online information of mounting options. a. Size information of Free Hanging. b. General Size information.



### TVR (Transmitting Voltage Response)



#### **Directivity Pattern**



