



Echo Sounding and High Frequency Transducer: Broadband & High Power

BII7560 series are broadband conical beam echo sounding and high frequency transducers which are optimized for use in short and long echo-ranging survey system, and in high resolution assessment of target and scattering strength (TS & Sv) in scientific survey of rivers, lakes, and sea. Because of their low Q property, short pulse width and Chirp/FM signals can be applied to these transducers to achieve high resolution and accurate spatial information underwater. Furthermore, the transducers are broadband ultrasonic sources for NDT, diagnostics, and material research. Customized transducers with low side lobes (<-30dB) are available.

Typical Applications

Fishery/Plankton Sonar, Echo-counting & integration/Abundance Estimate Navigation, Underwater Robot, Object Detection/Tracking/Avoidance Bathymetric Sounder, Depth Sounder, Short Range Communication Underwater Distance Gage, Altimeter/Liquid Level Detector	NDT, Diagnostics, and Material Research Sound Velocity Profiler/Velocimeter/Velocimeter Probe Target/Scattering Strength Measurement/Assessment (TS & Sv) Seafloor Properties: Scattering/Roughness/Penetration/Reflection...
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Specification

fs: Resonance Frequency in kHz. **TVR** unit: dB μ Pa/V@1m. **FFVS** unit: dB V/ μ Pa. **BW:** -3dB Beam Width. **SA:** Solid Angle, dB, $10\log\psi$. **Q_m:** Quality Factor.
-3dB Bandwidth = fs/Q_m . **MIPP:** Maximum Input Pulse Power at fs. **MCIP:** Maximum Continuous Input Power at fs. **MPW:** Maximum Pulse Width at MIPP and fs.
Near Field Distance $N \approx \lambda^2(21.15/BW)^2$, λ : Wavelength in meter, BW: Two-way Beam width in °.

Transducer	fs kHz	BW Two-way	Q _m	TVR	FFVS	SA Two-way	MIPP	MPW	MCIP	ΦDxL, mm	Weight kg
BII7560H/2000	2000	2.5°	4	175.5	-212.0	-27.0	120W	0.25s	3.5W	Φ21x20	≥ 0.05
BII7560Q/1000	1000	3.3°	3.42	166.4	-202.2	-24.4	70W	0.6s	6W	Φ27x20	≥ 0.05
BII7561/600	600	4.1°	4	166.6	-201.5	-22.5	480W	0.9s	12W	Φ33x20	≥ 0.06
BII7562/420	420	3.0°	4	175.4	-199.4	-25.3	2300W	1s	35W	Φ60x25	≥ 0.1

The transducers can be used at their 3rd harmonics or 3*fs. The Q_m = 6 to 9 at 3rd harmonics.

Side Lobes:	< -17.7 dB
η_{ea} at fs at fs:	0.3 to 0.8 in Water, Electroacoustic Efficiency, Load Medium Dependent.
Power Factor at fs:	0.3 to 0.7
Operating Depth:	1. Default: 300 m maximum. 2. Customization: 1000 m maximum is available upon request. Note: Operating Depth is limited by the cable length if the cable has wire leads or a non-waterproof connector.

Transducer	fs kHz	BW Two-way	Q _m	TVR	FFVS	SA Two-way	MIPP	MPW	MCIP	ΦDxL, mm	Weight kg
BII7561/500	500	5.0°	3	166.0	-200.0	-21.0	100W	2.0s	3.4W	Φ33x20	≥ 0.05
BII7562/38	38	37.0°	3	141.3	-165.9	-6.3	1200W	22s	6W	Φ60x70	≥ 0.6
BII7562/50	50	28.0°	3	142.0	-196.0	-8.7	1000W	17s	7W	Φ60x62	≥ 0.5
BII7562/70	70	20.0°	3	150.6	-196.0	-11.6	1200W	12s	9.5W	Φ60x50	≥ 0.5
BII7562/120	120	11.5°	3	158.7	-177.6	-16.3	1000W	7s	11W	Φ60x40	≥ 0.4
BII7562/200	200	7.0°	3	167.0	-196.0	-20.7	840W	4s	13W	Φ60x35	≥ 0.4
BII7562/300	300	5.8°	3	169.6	-196.5	-22.4	2300W	1.5s	30W	Φ60x25	≥ 0.3
BII7562/400	400	3.0°	3	171.0	-199.0	-25.4	400W	2.5s	13W	Φ60x25	≥ 0.1
BII7563/38	38	22.6°	3	145.1	-195.0	-8.1	2700W	22s	14W	Φ89x70	≥ 1.6
BII7563/50	50	17.0°	3	148.7	-195.0	-10.5	2300W	17s	15W	Φ89x62	≥ 1.2
BII7563/70	70	12.0°	3	157.4	-195.0	-13.4	2700W	12s	20W	Φ89x50	≥ 1.0
BII7563/120	120	7.0°	3	165.5	-195.0	-18.1	2200W	7s	24W	Φ89x40	≥ 1.0
BII7563/200	200	4.3°	3	173.7	-195.0	-22.5	1800W	4s	28W	Φ89x35	≥ 1.0
BII7564/70	70	8.6°	3	162.3	-194.0	-15.8	4800W	12s	30W	Φ114x50	≥ 2.0
BII7564/120	120	5.0°	3	170.4	-195.0	-20.5	4800W	7s	38W	Φ114x40	≥ 1.5
BII7566/20	20	20.5°	3	145.0	-180.0	-8.6	4800W	100s	34W	Φ168x85	≥ 6.0
BII7566/28	28	14.6°	3	146.7	-181.0	-11.6	4800W	85s	50W	Φ168x80	≥ 5.5
BII7566/38	38	10.6°	3	157.0	-183.0	-14.0	4800W	48s	48W	Φ168x70	≥ 5.0
BII7566/50	50	8.0°	3	160.6	-187.0	-16.5	4800W	32s	52W	Φ168x62	≥ 4.6
BII7566/70	70	5.6°	3	169.4	-172.8	-20.0	4800W	26s	67W	Φ168x38	≥ 4.0
BII7566/120	120	3.5°	3	177.5	-180.0	-24.6	4800W	12.5s	77W	Φ168x35	≥ 3.5

η_{ea} at fs at fs:	0.1 to 0.4 in Water, Electroacoustic Efficiency, Load Medium Dependent.
Power Factor at fs:	0.5 to 0.9
Side Lobes:	1. Default: < -17.7 dB and two-way BW is listed above. 2. Customized Side lobe suppression is available: ≤ -30 dB. Two-way BW is about 1.1 to 1.28 times larger. Append -SLS to the part number.
Operating Depth:	100 m Maximum and limited by the cable length if the cable has wire leads or a non-waterproof connector.

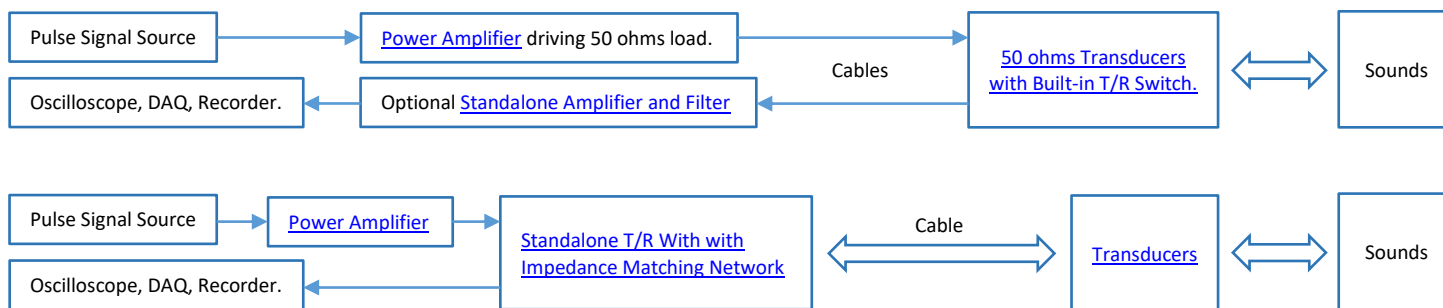
Following specs are for all BII7560 series transducers.

η_{ea} at f << fs:	at f << fs, $\eta_{ea} / \eta_{ea} \text{ at } fs \approx 0.1225 \cdot (k \cdot \Phi D)^2$. Wave Number $k = 2\pi/\lambda$; ΦD = Transducer Diameter. 1. Electroacoustic Efficiency η_{ea} is quite low at f << fs, and drops gradually at f > fs, so it is NOT recommended for transducers to emit high power sounds at frequencies far from fs. 2. Transducer can emit low power sounds at frequencies far from fs, such as input power $P_i \leq \eta_{ea} \cdot \text{MIPP}$ at f ≤ 0.8*fs and $P_i \leq 0.2 \cdot \text{MIPP}$ at f ≥ 1.3*fs.
Pulse Driving Signal:	Spike (Negative or Positive), pulse and burst SINE/Square/Chirp excitation.
Beam Pattern:	Conical Beam at fs; Omnidirectional at f << fs.
Operating Frequency:	1. Efficiency is low in the frequency range far from fs, so it is NOT recommended to operate transducer at frequency far from fs. 2. Transducer can operate in low power at frequency far from fs, the input power P_i should be much less than 1% MCIP at fs.

Radiation Sound Level SL:	SL = 20*logV _i + TVR, dB μPa@1m. Driving Voltage V _i is in unit of V _{rms} .	
Admittance (G and B):	refer to G-B Graph (enclosed with the shipment).	
Driving Voltage V _i at f _s :	Transducer without Impedance Matching Unit	Transducer with Impedance Matching Unit
	Pulsed Driving Signal and Duty Cycle D < 100%: Maximum V _i , V _{imax} = √(MIPP/G _{max}) or 600, whichever is less, in V _{rms} .	Pulsed Driving Signal and Duty Cycle D < 100%: Maximum V _i , V _{imax} = √(MIPP * Z), in V _{rms} . Z is impedance at f _s .
	Continuous Operation at 100% Duty Cycle: Maximum V _i , V _{imax} = √(MCIP/G _{max}), in V _{rms} .	Continuous Operation at 100% Duty Cycle: Maximum V _i , V _{imax} = √(MCIP * Z), in V _{rms} .
	To achieve higher sound level, built-in impedance matching is recommended to step up driving voltage inside the transducer.	
Input Power P _i :	P _i = V _i ² * G. Refer to G-B Graph : G is conductance, G _{max} is maximum G at f _s .	
How to determine pulse width, duty cycle and off-time with input pulse power (peak power) at f_s: 1. Determine the input pulse power (IPP, peak power) with sound intensity required by the project. IPP MUST be less than MIPP. 2. Pulse Width ≤ (MIPP * MPW*(120°c-T)/103°c)/IPP. T: Water Temperature in °c. 3. Duty Cycle D ≤ MCIP*(120°c-T)/103°c)/IPP. 4. Off-time ≥ PW*(1-D)/D.		
FFVS at f _s :	Refer to the table. Free-field Voltage Sensitivity.	
	<i>Sensitivity Loss over extension cable at f_s (dB) = 20 * log {(1 + 2πf_sC_c/B)/√[G² + (B + 2πf_sC_c)²]/(G² + B²)}</i> G: Conductance at f _s ; B: Susceptance at f _s ; C _c : Capacitance of Extension Cable. Cable is of 100 pF/meter roughly.	
Receiving Sound Level SL:	SL = 20*logV _o - FFVS, dB μPa. Receiving Voltage V _o is in unit of V _{rms} .	
Mounting Options:	1. Default: Free Hanging (FH) 2. Thru-hole Mounting with Single O-ring (THSO) 3. Thru-hole Mounting with Double O-ring (THDO) 4. Bolt Fastening Mounting (Stainless Steel) (BFMSS) 5. End-face Mounting (EFM) 6. Flange Mounting (FGM) 7. Flush Mounting (FSM) Please refer to online document AcousticSystem.pdf for a complete list of Mounting Options and more details.	
Cable Options:	1. Two Conductor Shielded Cable (SC), Rubber or PVC Jacket. SC with Two Conductors for transmit signal; SC with 4 conductors for receive signal. 2. 50 Ω RG58 Coax (RG58) 3. 50 Ω RG174/U Coax (RG174) 4. 50 Ω RG178/U Coax (RG178) (Operating Temperature Range: -70°C To +200°C) 5. Shielded Cable with Twisted Pair and Teflon (PTFE) Jacket, ΦD=3.2 mm (SC32), up to 200°C, AWG26 Conductors (Not Water-proofed, ONLY for Dry Air Use). 6. Shielded Cable with Twisted Pair and Teflon (PTFE) Jacket, ΦD=4.0 mm (SC40), up to 200°C, AWG20 Conductors (Not Water-proofed, ONLY for Dry Air Use). 7. Two Conductor Unshielded Cable (USC) Handling: Do not use the cable to support transducer weight in air and water if the transducer has a mounting part. Do not bend the cable.	
Cable Length:	1. Default: 1m. 2. Custom.	
Connector Options:	1. Default: Wire Leads (WL), for Transmit, Receive Signal, and DC Power Supply. 2. Male BNC (BNC) (Max. Diameter Φ14.3 mm), for Transmit or Receive Signal. BNC with RG178 Coax: Service Temperature up to 165°C or 329°F. 3. MIL-5015 Style (pin) (MIL) (Max. Diameter Φ19 to Φ30 mm), for Transmit or Receive Signal. 4. XLR Plug (pin) (XLR), Rating: 133 VRMS, 15A. (Max. Diameter Φ20.2 mm), for Transmit or Receive Signal. 5. 1/8" (3.5mm) TRS Plug (TRS) (Max. Diameter Φ10.5 mm), for Receive Signal ONLY. 6. Underwater Mateable Connector (pin) (UMC) (Max. Diameter Φ21.5 to Φ35 mm), for Transmit or Receive Signal. 7. +9VDC Battery Snap (BS), +9VDC or +18VDC power supply for Built-in T/R Switch. 8. 4mm Banana Plug Pair (Red and Black Color) (BP), DC power supply for Built-in T/R Switch. Note: Underwater Mateable Connector is for uses underwater. Other connectors and wire leads are for dry uses and are not waterproofed.	
Operation Temperature:	1. Default: -10 °C to +60 °C or 14 °F to 140 °F. 2. Bespoke High Temperature Transducer: -10 °C to 120 °C, or 14 °F to 248 °F. Append HT to part number.	
Storage Temperature:	-20 °C to +60 °C or -4 °F to 140 °F.	
Impedance Matching:	BII6000 Bespoke Impedance Matching between transducers and power amplifiers. Order Separately as standalone devices or append -IMxxΩ to the part number for integrating BII6000 into the transducer, and specify impedance in Ω. For example, BIIxxxx-IM8Ω: BIIxxxx transducer with built-in Impedance Matching unit as 8Ω load. TVR and FFVS variation of a transducer with built-in Impedance Matching Network: 1. When R _{IM} < 1/G, TVR increases, FFVS decreases. Generally, this is true for low frequency transducers. 2. When R _{IM} > 1/G, TVR decreases, FFVS increases. Generally, this is true for high frequency transducers. R _{IM} : Impedance-Matched Resistance such as 50 Ω. G: Transducer Conductance at Operating Frequency.	
TR Switch with Preamp and filter:	BII2100 Transmitting & Receiving Switch. 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.	
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.	
Potable Transmitter:	BII8030 series portable acoustic transmitters.	
Portable T/R System:	BII8080 series portable transmit and receive systems.	
WARNING: DANGER — HIGH VOLTAGE on wires. Wires shall be insulated for safety. DO NOT TOUCH THE WIRES BEFORE THE DRIVING SIGNAL IS SHUT DOWN. Cable shield must be grounded firmly for safety.		
for 50Ω BNC Male connector, it is buyer's sole responsibility to make sure that the (female) BNC shield of the signal source is firmly grounded for operating safety before hooking up transducer/hydrophone to the signal source. Coax with BNC is not intended for hand-held use at voltages above 30Vac/60Vdc.		

Specifications of Built-in T/R Switch for Sound Receiving with Transducer BII756x/xx-TR or BII756x/xx-TRIMxxΩ.		
Preamp and Filter:	Yes, Fixed Gain Preamp and Filter are built inside transducer housing. 1. Avoid saturation caused by strong sounds levels in low frequency range. 2. Avoid signal loss over cable. 3. Avoid signal loss caused by impedance matching network which is built inside transducers.	
Preamp Gain:	1. Default: 40 dB 2. Bespoke: 0 dB to 60 dB.	1. Default: 40 dB 2. Bespoke: 20 to 60 dB.
-3dB Bandwidth:	1. Default: 1 Hz to 450 kHz. 2. Customized. Specify when ordering.	1. Default: 100 kHz to 10 MHz. 2. Customized. Specify when ordering.
	1. Reduce Noise. Both ocean ambient noises and the self-noises of electronic devices decrease when frequency increases. It is recommended to choose a built-in high pass filter to reject noises in low frequency range. For example, if you are interested in the signals greater than 200 Hz, you may specify a high pass filter with -3dB cut-off frequency at 100 Hz to improve signal to noise ratio of the signals of the interest. 2. Avoid Saturation. When there are strong low frequency noises, disturbances, and/or vibrations, resulting from rough surface waves and/or mechanical movements of the platform, it is recommended to specify a high pass filter to avoid hydrophone saturation in these low frequency ranges.	
Voltage Noise RTI e_n :	7.0 nV/√Hz at default gain.	1.0 nV/√Hz at default gain.
Current Noise RTI i_n :	0.56 fA/√Hz.	1.6 pA/√Hz.
Input Dynamic Range:	≥ 100 dB at 100 kHz Bandwidth.	
Band Pass Filter:	1 st and/or 2 nd order, 20/Decade to 40 dB/Decade Roll-off.	
Output Signal Type:	Differential	Single-ended
Output Impedance:	10 Ω	50 Ω
Cable Drive Capability:	200 m	1000 m
Cable:	Four Conductor Shielded Cable	Four Conductor Shielded Cable or Two Coaxial cables. Cable type being used is determined by frequency range and cable length.
Connector:	Refer to Connector Options .	
Signal Conditioning:	Standalone Programmable Gain Amplifier and Filters to compensate the loss of sound propagation and spreading. Order separately.	
Power Supply		
Supply Voltage V_s :	+8.5 to +32 VDC	+7.5 to +32 VDC
Current (Quiescent):	6.8 mA	8 mA
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 above rated voltage. DO NOT use switching mode DC power supply.	
DC Supply Cable:	Two Conductor Shielded Cable if the cable of Receiving Signal is Coax.	
DC Supply Connector:	Refer to Connector Options .	

System Setup of Transmitting and Receiving Sounds.



Wiring Information of a Transducer without T/R Switch.

Single Ended Signal:	Shielded Cable	Coax, BNC, SMC, or SMA	Underwater Connector	MIL-5015 Connector	XLR Plug
Signal:	White or Red	Center Contact	Contact 2	Contact C	Pin 2
Signal Common:	Black	Shield	Contact 1	Contact B	Pin 3
Shielding and Grounding	Shield	Shield	Contact 3	Contact A	Pin 1

Wiring Information of Transmitting Sounds of a Transducer with T/R Switch.

Single Ended Signal:	Shielded Cable	Coax, BNC, SMC, or SMA	Underwater Connector	MIL-5015 Connector	XLR Plug
Signal:	White or Red	Center Contact	Contact 2	Contact C	Pin 2
Signal Common:	Black	Shield	Contact 1	Contact B	Pin 3
Shielding and Grounding	Shield	Shield	Contact 3	Contact A	Pin 1

Wiring Information of Receiving Sounds of a Transducer with T/R Switch.

Differential Output:	Wire Leads	Underwater/XLR 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, Green, or Yellow	Pin 4	XLR Pin 3	TRS Ring
Signal Common	N/A	N/A	XLR Pin 1	TRS Sleeve
Shielding	Shield	N/A	XLR Metal Shell	N/A

Single Ended Output:	Wire Leads	BNC Male, 9V Battery Snap	Underwater/XLR 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 Shield	Pin 4	XLR Pin 1 and Pin 3	TRS Ring and Sleeve
Shielding	Shield	N/A	N/A	XLR Metal Shell	N/A
4mm Banana Plug Pair: Red Plug for +VDC, Black Plug for Common of the DC power supply.					

Wiring Information of Temperature Signal.

Single Ended Signal:	Shielded Cable	Coax, BNC	Underwater Connector	XLR Plug	TRS Plug
Signal:	White or Red	Center Contact	Contact 2	Pin 2	Tip
Signal Common:	Black	Shield	Contact 1	Pin 3	Ring
Shielding and Grounding	Shield	Shield	Contact 3	Pin 1	Sleeve

How to Order Transducers without T/R Switches. The default options are for stock items which are regularly available.

FH: Free Hanging. SC for Transmit: Shielded Cable (Rubber Jacket, 600V) with 2 conductors. Coax: 50 Ω Coaxial Cable. WL: Wire Leads.					
Part Number	-Appendage	-Mounting	-Cable Length	-Cable Type	-Connector for signals of Transmit and Temperature Sensor
BII756x/xx	Default: None.	Default: FH.	Default: 10m.	SC for low frequency signal. Coax for high frequency signal.	Default: WL.
Example:		Description			
BII7562/70-BFMSS-6m-SC-UMC		BII7562/70 Transducer, Bolt Fastening Mounting (Stainless Steel) (BFMSS), 6m Shielded Cable, Male Underwater Mateable Connector.			
BII7562/70-IM50 Ω -FH-30m-RG58-BNC		BII7562/70 Transducer, Built-in Impedance Matching Network as 50 Ω load, Free Hanging, 30m RG58 Coax, Male BNC.			
BII7562/70-IM8 Ω -FH-10m-SC-XLR		BII7562/70 Transducer, Built-in Impedance Matching Network as 8 Ω load, Free Hanging, 10m Shielded Cable, XLR Plug.			
BII7562/70-TS-IM8 Ω -FH-10m-SC-WL/TRS		BII7562/70 Transducer, Built-in Temperature Sensor, Built-in Impedance Matching Network to 8 Ω , Free Hanging, 10m Shielded Cable, Wire Leads for Transmit Signal, TRS for Temperature Signal.			

How to Order Transducers with T/R Switches. The default options are for stock items which are regularly available.

FH: Free Hanging. SC for Low Frequency Transmit: Shielded Cable (Rubber Jacket, 600V) with 2 conductors. Coax for High Frequency Transmit: 50 Ω Coaxial Cable. SC for Low Frequency Receive: Shielded Cable with 4 conductors. Coax for High Frequency Receive: 50 Ω Coaxial Cable. WL: Wire Leads. HPF: -3dB High Pass Filter Frequency. LPF: -3dB Low Pass Filter Frequency. Cable of Temperature sensor is two-conductor shielded cable. Cable of DC Supply is two-conductor shielded cable in case that receive cable is coax.							
Part Number	-Appendage	-Receive Gain	-HPF/LPF	-Mounting	-Cable Length	-Cable Type	-Connector for signals of Transmit/Receive/DC Supply/Temperature
BII756x/xx	Default: TRIM50 Ω	Default: 40 dB	-3dB Receive bandpass Frequencies.	Default: FH.	Default: 10m.	Default: SC or Coax	Default: WL.
Example:		Description					
BII7562/70-TR-IM50 Ω -40dB-100Hz/200kHz-BFMSS-10m-SC-MIL/XLR/BS		BII7562/70 Transducer, Built-in T/R Switch, Built-in Impedance Matching Network as 50 Ω load, Receive Gain: 40dB, Receive Bandpass Filter: 100Hz to 200kHz. Bolt-fastening Mounting (Stainless Steel), 10m Shielded Cable, MIL-5015 Connector for Transmit Signal, XLR for Receive Signal, 9V Battery Snap for DC Supply.					
BII7562/70-TS-TR-IM50 Ω -40dB-100Hz/200kHz-BFMSS-10m-SC-MIL/XLR/BS/TRS		BII7562/70 Transducer, Built-in Temperature Sensor, Built-in T/R Switch, Built-in Impedance Matching Network as 50 Ω load, Receive Gain: 40dB, Receive Bandpass Filter: 100Hz to 200kHz. Bolt-fastening Mounting (Stainless Steel), 10m Shielded Cable, MIL-5015 Connector for Transmit Signal, XLR for Receive Signal, 9V Battery Snap for DC Supply, TRS for Temperature Signal.					
BII7560H/2000-TR-IM50 Ω -40dB-0.1MHz/10MHz-FH-10m-RG58-BNC/BNC/BS/TRS		BII7560H/2000 Transducer, Built-in T/R Switch, Built-in Impedance Matching Network as 50 Ω load, Receive Gain: 40dB, Receive Bandpass Filter: 0.1MHz to 10MHz. Free Hanging, 10m RG58 Cable, BNC Male Connector for Transmit Signal, BNC Male for Receive Signal, 9V Battery Snap for DC Supply, TRS for Temperature Signal.					

Question:

What if the mating connector of my DAQ module or recording device is NOT available from BII?

1. Buyer may order BII products with wire leads, and buyer assembles the mating connector to the cable end.
2. A connector adaptor might be assembled by BII by customization, and BII ships the adaptor to buyer as accessory of the device. Please contact BII for customizations.
3. Many adaptors for standard connectors are available in worldwide electronic suppliers such as BNC to SMA, BNC to SMC, XLR to TRS, etc. Check out your local suppliers.

What are the advantage and disadvantage of a built-in T/R Switch and a standalone T/R Switch?

A built-in T/R Switch amplifies the received signal of the sensing element before the signal is polluted by EMI noise, and before it is attenuated by cable capacitance, inductance, and resistance.

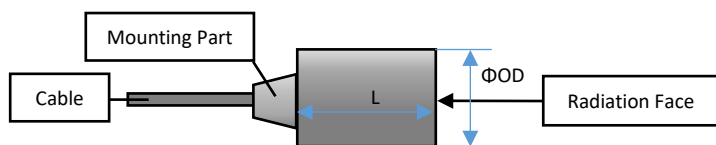
Cable and Connector Information for High Power Signals (from Power Amplifier and to Transducers). Non-UL Uses.

Cable:	Wire and Cable Types	Ratings of Voltage, Current or Power, and Temperature.
	AWG18 Wires (WR)	3000 Vrms, 10 Arms.
	Two Conductor Shielded Cable (SC)	600 Vrms, 5 Arms.
	High Temperature Shielded Cable (HTSC199)	600 Vrms, 6 Arms, up to +199°C or 390 °F, Non-waterproof.
	Coax RG58 (50 Ω) (RG58)	1400 Vrms, 4 Arms.
	Coax RG174/U (50 Ω) (RG174)	1100 Vrms, 1.6 Arms.
Connector:	Coax RG178B/U (50 Ω) (RG178).	750 Vrms, 0.86 Arms, up to +200°C or 390°F.
	Connector Type	Ratings of Voltage, Current or Power, and Temperature.
	1. Wire Leads (WL)	Used for Cables or Wires.
	2. 50 Ω BNC (BNC), Bayonet Lock. Panel Mount or In-line.	500Vrms, 316W.

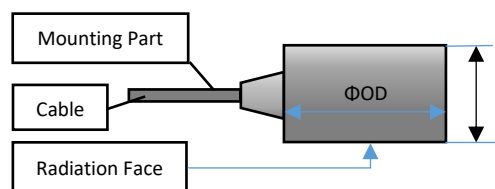
	In-line BNC: Input uses Pin, output uses Socket. Panel Mount BNC: Both Input and Output use BNC Jacks.	-65°C to 165°C, or -53.9°F to 329°F. Used for Metal Enclosures or Coax Cables.
3. MIL-5015 Type Connector (MIL), Thread Fastening. Panel Mount or In-line. Input uses Pin, output uses Socket.		500Vrms, 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. 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.
5. Underwater Mateable Connector (UMC), Thread Fastening. Panel Mount or In-line. Input uses Pin, output uses Socket.		600Vrms, 10A. Waterproof, IP68. Used for Metal Enclosures or Shielded Cables.
How to choose cable and connector for BII devices: Driving Voltage $V_{drive} (V_{rms}) = \sqrt{Power * R_L} = \sqrt{Power/G}$. R_L : Resistance of a transducer in load medium at f_s . G : conductance at f_s ; $R_L = 1/G$ at f_s . BII lists G-B data at f_s and/or the graph of G-B vs Frequency in online datasheet.		
Case 1. Deliver 1000 Wrms to 3 kΩ transducer at f_s . Note: the 3 kΩ is the resistance of the transducer in load medium at f_s . Driving voltage to transducer $V_{drive} = \sqrt{1000 * 3000} = 1732 V_{rms}$. The current to 3 kΩ transducer $I_{drive} = V_{drive}/R_L = 1732V_{rms}/3000Ω = 0.57733 A_{rms}$. Therefore, AWG18 Wire and Wire leads are suitable.		
Case 2. Deliver 500 Wrms to 300 Ω transducer at f_s . Note: the 300 Ω is the resistance of the transducer in load medium at f_s . Driving voltage to transducer $V_{drive} = \sqrt{500 * 300} = 387.3 V_{rms}$. The current to 300 Ω transducer $I_{drive} = V_{drive}/R_L = 387.3V_{rms}/300Ω = 1.291 A_{rms}$. Therefore, Two Conductor Shielded Cable and MIL-5015 Type Connector or Underwater Mateable Connector (UMC) are suitable.		
Case 3. Deliver 300 Wrms to 50 Ω transducer at f_s . Driving voltage to transducer $V_{drive} = \sqrt{300 * 50} = 122.5 V_{rms}$. The current to 50 Ω transducer $I_{drive} = V_{drive}/R_L = 122.5V_{rms}/50Ω = 2.45A_{rms}$. Therefore, 50Ω RG58 Coax and BNC are suitable.		

Physical Size (Dimensional Unit: mm): The overall length varies with mounting parts.

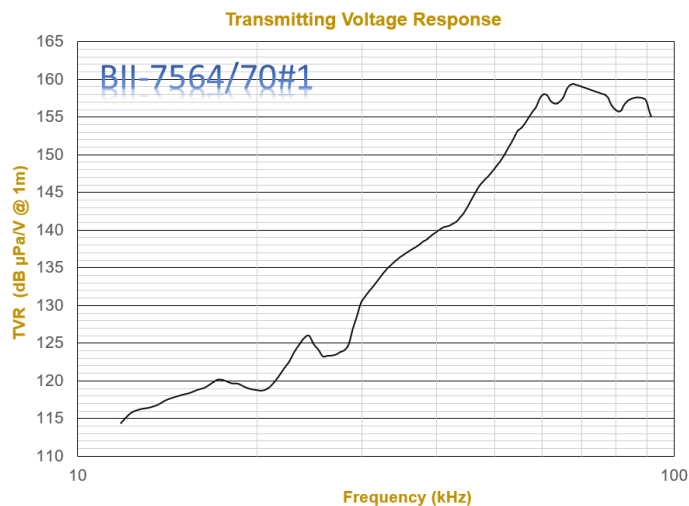
a. General Size information.



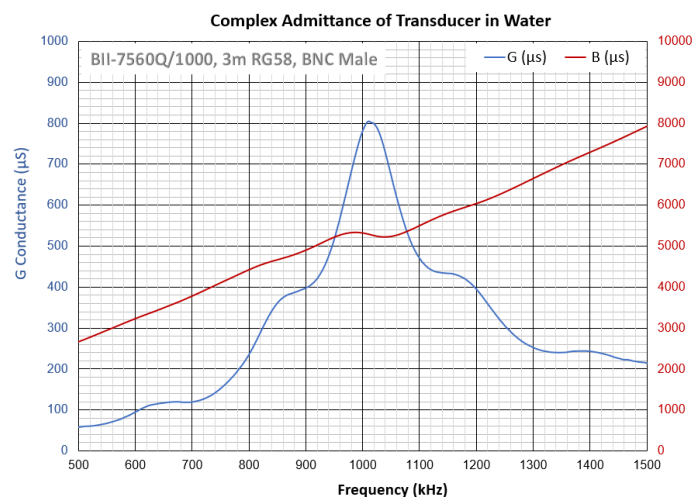
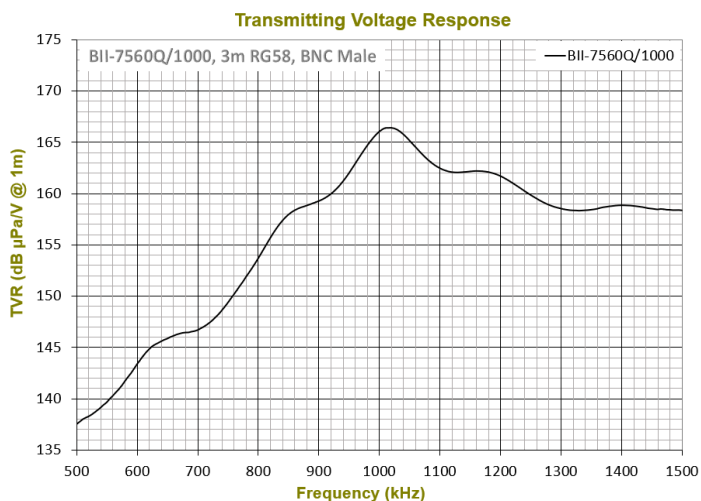
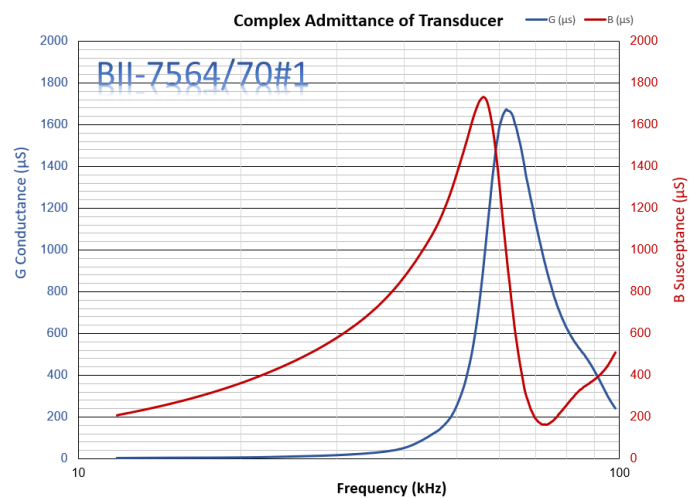
b. Size information of Customized Cable Orientation: Side Wall.



Transmitting Voltage Response (TVR):



Admittance:



Directivity Pattern:

