

BII-7620 Series Directional Low Frequency Transducers

The directional low frequency transducers emit directional fan-shaped beams around 70° x 50° from 5 to 25 kHz range.

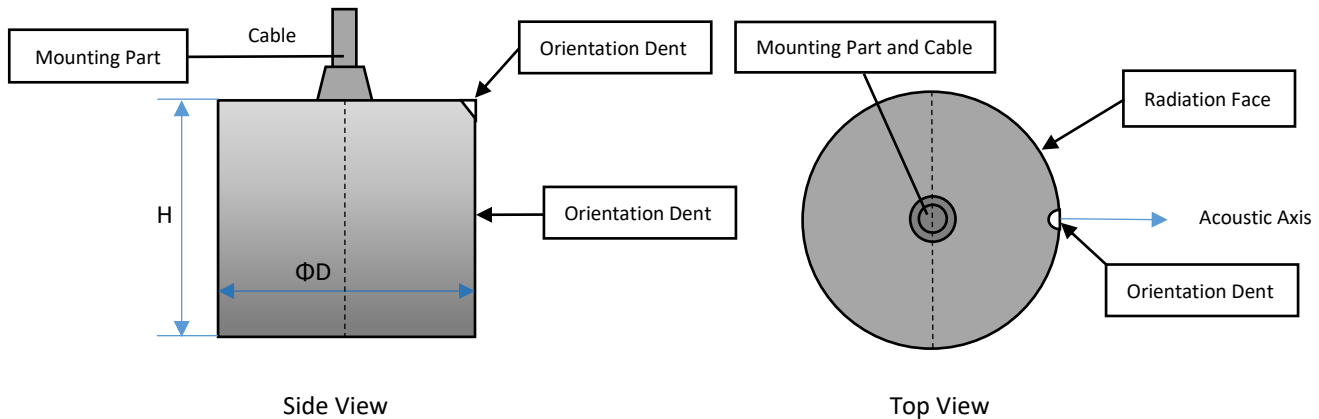
Typical Applications			
Underwater Communication/Telephone/Pinger	Artificial Acoustic Target	Echo-Repeater, Active-Acoustic Target	Marine Bioacoustics

Specification

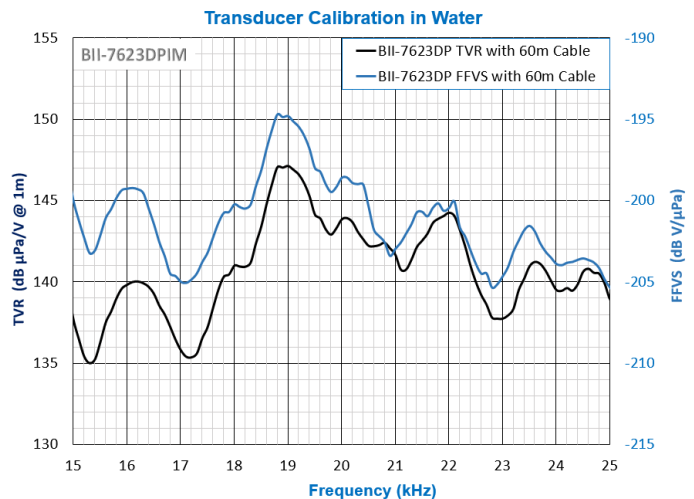
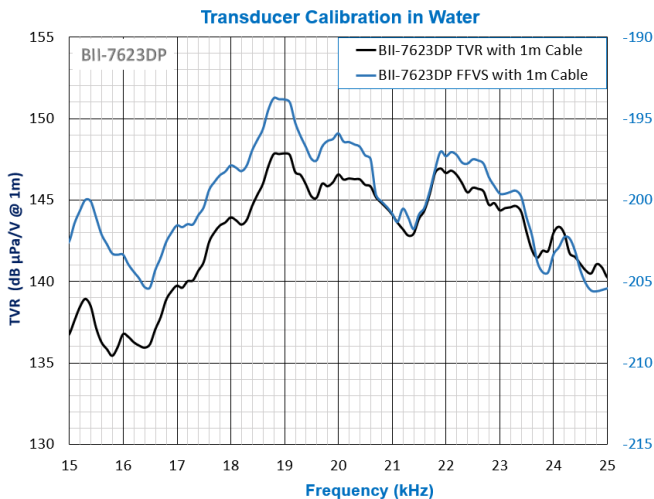
TVR: Transmitting Voltage Response, $\mu\text{Pa}/\text{V}@1\text{m}$. FFVS: Free-field Voltage Sensitivity, $\text{V}/\mu\text{Pa}$. MIPP: Maximum Input Pulse Power at f_s . MPW: Maximum Pulse Width at MIPP and at f_s . MCIP: Maximum Continuous Input Power at f_s .			
Low Frequency Transducer	BII-7623DP	BII-7624DP	BII-7626DP
Signal Type:	SINE Pulse, Chirp, PSK, FSK, Pulsed Square Waveform, etc...		
Resonant Frequency f_s :	18 to 22 kHz	10 to 12 kHz	6 to 8 kHz
	1. 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. 2. Transducer can operate in low power at frequency far from f_s, the input power P_i should be much less than 1% MCIP at f_s.		
Directivity Pattern:	Fan-shaped Beam		
-3 dB Beam Width: (Horizontal x Vertical)	70° x 50°	68° x 55°	75° x 60°
	Bespoke Vertical beam width is available. Contact BII for more information.		
Side Lobe Level:	Side lobes ≤ -28 dB		
Free Capacitance C_f @ 1kHz:	130 nF	260 nF	350 nF
	C_f is valid for transducers without built-in impedance matching.		
Dissipation D @ 1kHz:	0.005 at low electric field.		
Quality Factor Q_m :	2.2	2.3	2.5
TVR at f_s :	148.0 dB	146.0 dB	144.6 dB
Radiation Sound Level SL:	SL = $20 \cdot \log V_i + \text{TVR}$, dB $\mu\text{Pa}@1\text{m}$. Driving Voltage V_i is in unit of V_{rms} .		
Admittance at f_s :	$G_{max}=5$ mS, B=12.8 mS.	$G_{max}=8.7$ mS, B=17.6 mS.	$G_{max}=7.0$ mS, B=15.8 mS.
Transducer without Impedance Matching Unit			
Driving Voltage V_i at f_s :	Pulsed Driving Signal and Duty Cycle D < 100%: Maximum V_i , $V_{imax} = \sqrt{(\text{MIPP}/G_{max})}$ or 300, whichever is less, in V_{rms} . Continuous Operation at 100% Duty Cycle: Maximum V_i , $V_{imax} = \sqrt{(\text{MCIP}/G_{max})}$, in V_{rms} . To achieve higher sound level, built-in impedance matching is recommended to step up driving voltage inside the transducer.		
Transducer with Impedance Matching Unit			
Driving Voltage V_i at f_s :	Pulsed Driving Signal and Duty Cycle D < 100%: $V_{imax} = \sqrt{(\text{MIPP} \cdot Z)}$, in V_{rms} . Z is impedance with Impedance Matching Unit at f_s . Continuous Operation at 100% Duty Cycle: Maximum V_i , $V_{imax} = \sqrt{(\text{MCIP} \cdot Z)}$, in V_{rms} .		
Input Power P_i :	$P_i = V_i^2 \cdot G$. Refer to G-B Graph : G is conductance, G_{max} is maximum G at f_s .		
MIPP at f_s :	850 Watts	850 Watts	1500 Watts
MPW at MIPP and f_s :	40 Seconds	85 Seconds	220 Seconds
MCIP at f_s :	120 Watts	160 Watts	320 Watts
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 $\leq (\text{MIPP} \cdot \text{MPW} \cdot (120^\circ\text{C}-T)/103^\circ\text{C})/\text{IPP}$. T: Water Temperature in $^\circ\text{C}$. 3. Duty Cycle $D \leq \text{MCIP} \cdot (120^\circ\text{C}-T)/103^\circ\text{C}/\text{IPP}$. 4. Off-time $\geq \text{PW} \cdot (1-D)/D$.			
FFVS at f_s :	-194.0 dB	-190.0 dB	-189.5 dB
	<i>Sensitivity Loss over extension cable at f_s (dB) = $20 \cdot \log \left\{ \frac{(1 + 2\pi f_s C_c / B)}{\sqrt{[G^2 + (B + 2\pi f_s C_c)^2] / (G^2 + B^2)}} \right\}$</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 = $20 \cdot \log V_o - \text{FFVS}$, dB μPa . Receiving Voltage V_o is in unit of V_{rms} .		
Operating Depth:	Maximum 100 m and Limited by the cable length if the cable has wire leads or a non-waterproof connector.		
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) Please refer to online document AcousticSystem.pdf for a complete list of Mounting Options and more details.		
Cable:	1. Two Conductor Shielded Cable (SC), Rubber or PVC Jacket. 2. 50 Ω RG58 Coax (RG58) 3. Shielded Cable with Twisted Pair and Teflon (PTFE) Jacket, $\Phi\text{D}=3.2$ mm (SC32), up to 200 $^\circ\text{C}$, AWG26 Conductors. 4. Shielded Cable with Twisted Pair and Teflon (PTFE) Jacket, $\Phi\text{D}=4.0$ mm (SC40), up to 200 $^\circ\text{C}$, AWG20 Conductors. 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: 1 m. 2. Custom.		
Connector:	1. Default: Wire Leads (WL) 2. Male BNC (BNC) (Max. Diameter $\Phi 14.3$ mm) 3. MIL-5015 Style (pin) (5015) (Max. Diameter $\Phi 30$ mm with 3 contacts) 4. LEMO (Plug Male Pins) (LEMO) (Max. Diameter $\Phi 9.5$ mm with 3 contacts) 5. Underwater Mateable Connector (pin) (UMC) (Max. Diameter $\Phi 21.5$ to $\Phi 35$ mm) 6. Customized, buyer specifies the connector. (Custom)		

	Note: Underwater Mateable Connector is for uses underwater. Other connectors and wire leads are for dry uses and are not waterproofed.				
Size $\Phi D \times H$:	$\Phi 89 \times 90$ mm	$\Phi 114 \times 140$ mm	$\Phi 168 \times 180$ mm	Actual length depends on Mounting Parts.	
Weight:	≥ 1.0 kg with 10 m cable. Actual weight depends on Mounting Parts, Cable Types and Length.				
Operation Temperature:	-10°C to $+60^{\circ}\text{C}$ or 14°F to 140°F .				
Storage Temperature:	-20°C to $+60^{\circ}\text{C}$ or -4°F to 140°F .				
Impedance Matching:	BII-6000 Bespoke Impedance Matching between transducers and power amplifiers. Order Separately. Append IM to the part number for integrating BII-6000 in the transducer, and specify impedance in Ω . For example, BII-xxxxIM50 Ω : BII-xxxx transducer with built-in Impedance Matching unit as a 50 Ω load.				
TR Switch:	BII-2100 Transmitting & Receiving Switch. Not Included. Order Separately, Append TR to part number (BII-xxxxTR).				
Temperature Sensor:	1. Default: No built-in temperature sensor. 2. Built-in temperature sensor . Append TS to part number (BII-xxxxTS) for integrating a temperature sensor in the transducer.				
Portable Transmitter:	BII-8030 series portable acoustic transmitters.				
Portable T/R System:	BII-8080 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 50 Ω BNC connector, it is buyer's sole responsibility to make sure that the 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.					
Wiring:	Two Conductor Shielded Cable	BNC	Underwater Connector	MIL-5015 Connector	LEMO Connector
Signal	White or Red	Center Contact	Contact 2	Contact C	Contact 2
Signal Common	Black	Shield	Contact 1	Contact B	Contact 1
Shielding and Grounding	Shield	Shield	Contact 3	Contact A	Contact 3

Physical Size (Dimensional Unit: mm)

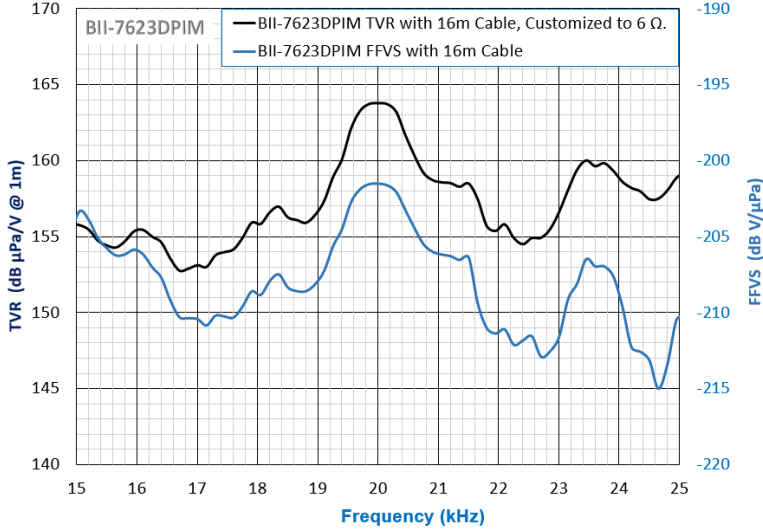


TVR (Transmitting Voltage Response) and FFVS (Free-field Voltage Response), No Built-in Impedance Matching.



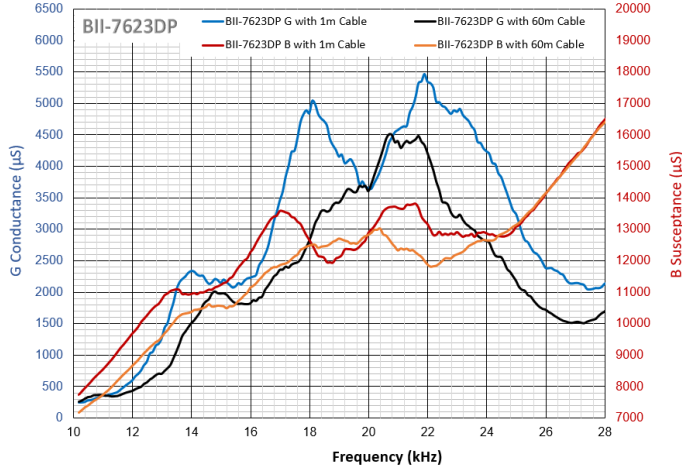
TVR and FFVS, with Built-in Impedance Matching

Transducer Calibration in Water



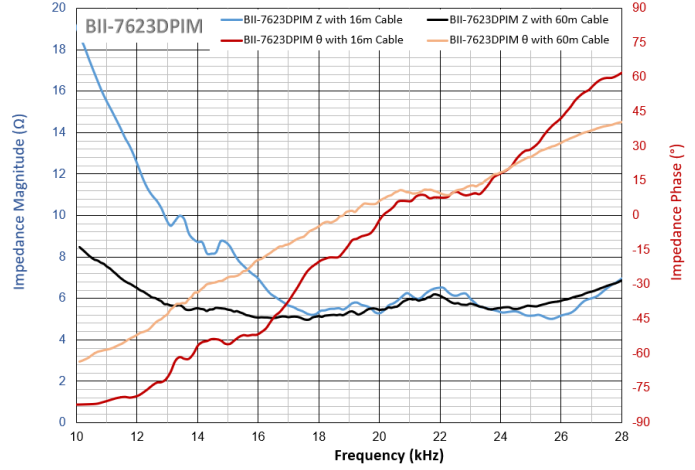
Admittance

Complex Admittance of Transducer in Water



Impedance Matching for Audio Power Amplifier (BII-5060 Series PA)

Complex Impedance of Transducer in Water



Directivity Pattern:

